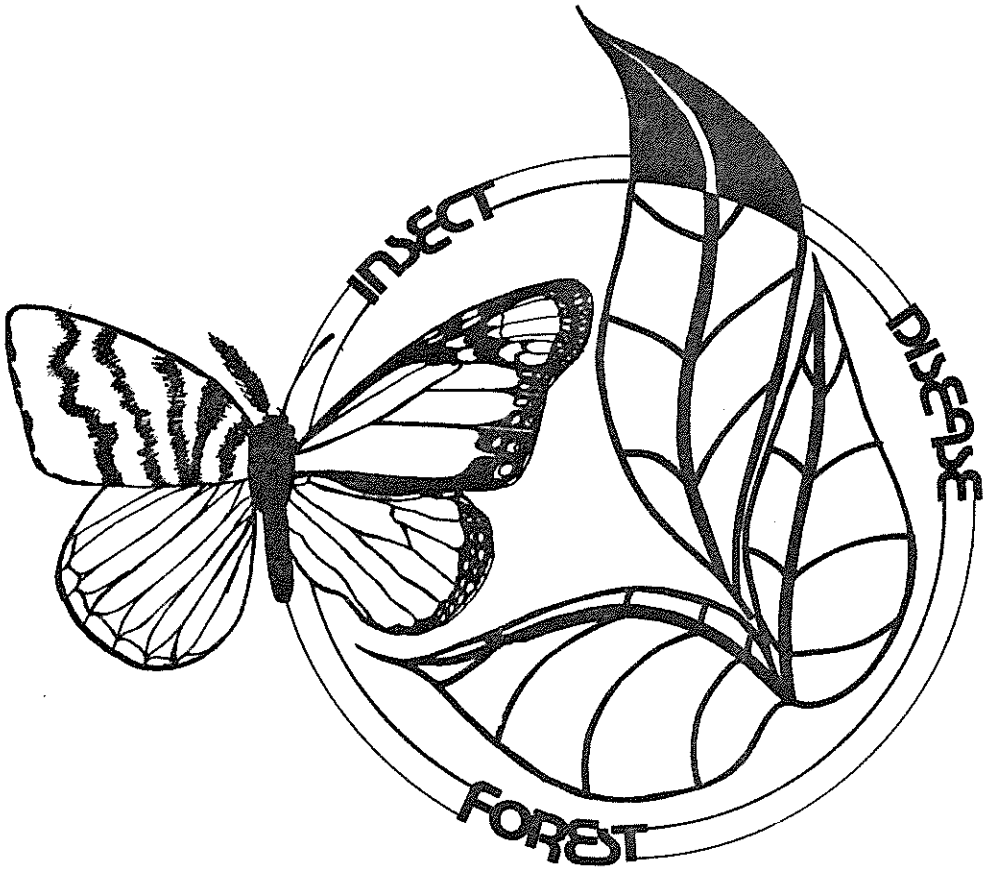
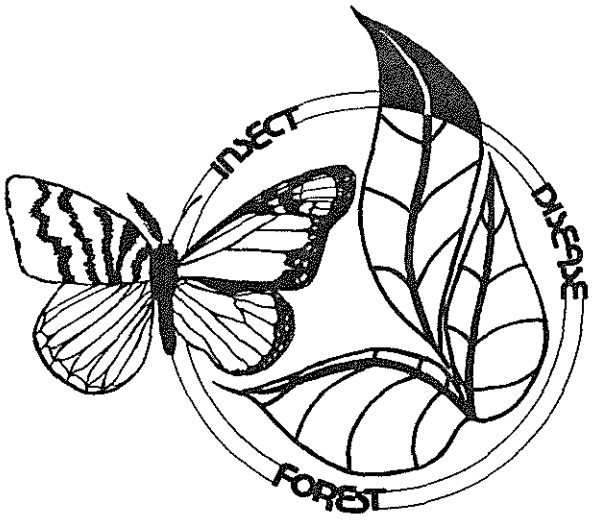
MISSOURI FOREST PEST REPORT 1982



Missouri Department of CONSERVATION

Forestry Division

MISSOURI FOREST PEST REPORT



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1. Black Turpentine Beetle, Dendroctonus terebrans, (Oliv.)
2. Bronze Birch Borer, Agrilus anxius, (Gory)
3. Carpenterworm, Prionoxystus robiniae, (Peck)
4. Cottonwood Borer, Plectrodera scalator, (F.)
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10. Fall Webworm, Hyphantria cunae, (Frury)
11. Gypsy Moth, Porthetria dispar, (L.)
12. Loblolly Pine Sawfly, Neodiprion taedae linearis, (Ross.)
13. Looper Complex
14. Nantucket Pine Tip Moth, Rhyacionia frustrana, (Comstock)
15. Pales Weevil, Hylobius pales, (Hbst.)
16. Poplar Tent Maker, Ichthyura inclusa, (Hbn.)
17. Red Oak Borer, Enapholodes rufulus, (Haldeman)
18. Redheaded Pine Sawfly, Neodiprion leconte, (Fitch)
19. True Tree Grasshopper, Dendrotettix quercus, (Pack.)
20. Two-lined Chestnut Borer, Agrilus bilineatus, (Web.)
21. Variable Oak Leaf Caterpillar, Heterocampa manteo (Dbldy.)
22. Walnut Caterpillar, Datana integerrima, (G. & P.)
23. White Pine Aphid, Cinara strobi, (Fitch)

INSECTS OBSERVED IN 1982 - NOT DISCUSSED IN REPORT

1. Asiatic Oak Weevil, Cyrtepistomus castaneus, (Roelofs)
2. Catalpa Sphinx, Ceratomia catalpae, (Bdv.)
3. Green-stripped Mapleworm, Anisota rubicunda, (F.)
4. Ips Beetle, Ips sp.
5. Juniper Sawfly, Monoctenus melliceps, (Cresson)
6. Monarch Butterfly, Danaus plexippus, (L.)
7. Pin Oak Sawfly, Caliroa lineata, (MacGillivary)
8. Obscure Scale, Melanaspis obscura, (Comstock)
9. Pine Needle Scale, Phenacaspis pinifoliae, (Fitch)
10. Saddleback Caterpillar, Sibine stimulea, (Clem.)
11. Twig Girdler, Oncideres cingulata, (Say)
12. Viceroy Butterfly, Limentis archippus, (Cramer)
13. Walking Stick, Diapheromera femorata, (Say)
14. Wheel Bug, Arilus cristatus, (Linn.)
15. White Pine Bark Aphid, Pineus strobi, (Htg.)

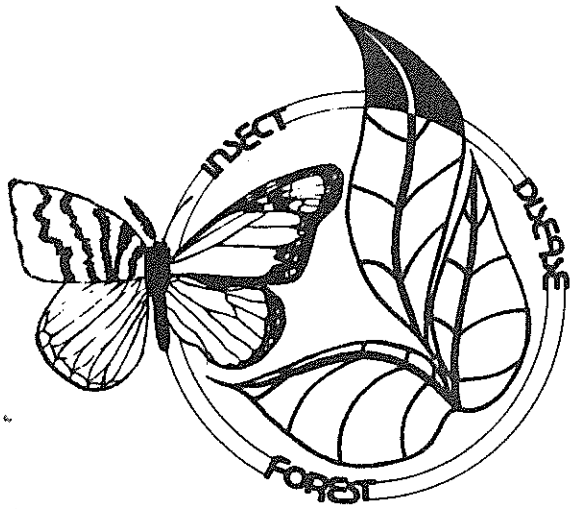
DISEASES OBSERVED IN 1982 - DISCUSSED IN REPORT

1. Actinopelte Leaf Spot of Oak, Actinopelte dryina (Sacc.) Hoehn.
2. Brown-Spot Needle Blight, Scirrhia acicola (Dearn.) Sigg.
3. Naemacyclus Needle Cast, Naemacyclus minor Butin
4. Oak Wilt, Ceratocystis fagacearum (Bretz) Hunt
5. Pine Needle Rust, Coleosporium asterum (Diet.) Syd.
6. Verticillium Wilt, Verticillium dahliae Kleb.

DISEASES OBSERVED IN 1982 - NOT DISCUSSED IN REPORT

1. Apple Scab, Venturia inaequalis (Cke.) Wint. ap. Thum.
2. Annosus Root Rot, Heterobasidion annosum (Fr.) Bref.
3. Armillaria Root Rot, Armillariella mellea (Vahl. ex Fr.) Karst.
4. Ash Anthracnose, Gloeosporium aridum Ell. & Holw.
5. Ash Decline, unknown
6. Bacterial Wetwood of Elm, Erwinia nimipressuralis (Burr.) Winsl.
7. Black Knot of Plum and Cherry - Dibotryon morbosum (Schw.) Th. & Syd.
8. Botryosphaeria Canker of Sweet Gum - Botryosphaeria ribis (Tod. ex Fr.) Gross & Dug.
9. Cedar-Apple Rust, Gymnosporangium juniperi-virginianae Schw.
10. Cytospora Canker of Poplar, Cytospora chrysosperma (Pers.) F.
11. Diplodia Tip Blight, Diplodia pinea (Desm.) Kickx.
12. Dothiorella Canker of Oak, Dothiorella quercina (Cke. & Ell.) Sacc.
13. Dothistroma Needle Blight, Dothistroma pini Hulb.
14. Dutch Elm Disease, Ceratocystis ulmi (Buism.) C. Moreau
15. Eastern Gall Rust, Cronartium quercuum (Berk.) Miy. ex Shirai
16. Elm Phloem Necrosis, mycoplasma

17. Fire Blight, Erwinia amylovora (Burr.) Winsl.
18. Fusarium Canker of Walnut, Fusarium solani (Mart.) App. & Wr. em Snyd. & Hans.
19. Hypoxylon Canker of Oak, Hypoxylon spp.
20. Maple Anthracnose, Gloeosporium apocryptum E. & E.
21. Maple Canker, Steganosporium spp.
22. Maple Decline, unknown
23. Nectria Canker, Nectria galligena Bres.
24. Nectria Cinnabarina Canker, Nectria cinnabarina Tode ex Fr.
25. Oak Anthracnose, Gnomonia quercina Kleb.
26. Oak Leaf Blister, Taphrina caerulescens (Mont. & Desm.) Tul.
27. Phomopsis Blight, Phomopsis juniperova Hahn
28. Pin Oak Chlorosis, iron deficiency
29. Pine Wilt Disease, Bursaphelenchus xylophilus (Steiner and Buhrer) Nickle
30. Powdery Mildew of Oak, Phyllactinia sp.
31. Rhizosphaera Needle Cast, Rhizosphaera kalkhoffii Bub.
32. Smooth Patch of White Oak, Aleurodiscus oakesii (B. & C.) Hoehn. & Litsch.
33. Sweet Gum Chlorosis, iron deficiency
34. Sycamore Anthracnose, Gnomonia platani Edg.
35. Walnut Anthracnose, Gnomonia quercina Kleb.
36. Western Gall Rust, Endocronartium harknesii (J. P. Mon) Y. Hirat
37. White Pine Root Decline, Verticicladiella procera Kensl.
38. Winter Drying, weather



MISSOURI FOREST PEST REPORT

Forestry Division

INTRODUCTION

This is our twentieth Annual Forest Pest Report. Over the past twenty years we have had extremely dry weather, extremely wet weather and everything in between. Similarly, we have had years with numerous bothersome insect and disease problems and others that were rather routine in nature. We have seen cycles of the variable oak leaf caterpillar and the looper complex and of periodic occurrences of oak wilt. Drought effects were evident in our hardwood forests.

In 1980, our total rainfall came up short by over twelve inches. In 1982, rainfall measured more than twelve inches above the average annual amount. With these great variations, trees and shrubs usually are able to adapt. Site plays a big factor in determining how well a tree is able to survive under varying degrees of soil saturation. Stress can be induced if the soil is too dry or too wet. These factors, among others, are considered when attempting to diagnose a tree problem.

Insect and disease wise, 1982 was not a particularly noteworthy year. We had no large outbreak involving hundreds or thousands of acres. Gratefully, it was one of those "normal" years. There were still plenty of questions to answer, diseases to be diagnosed, and insects or problems to be identified.

On the distant horizon, however, looms the threat of the imported gypsy moth. We know what is happening in other states, but we are not certain when we will have to deal with spot and widespread infestations.

Probably, the most insidious forest problem experienced this year was continuing mortality of black and scarlet oak in south central Missouri. These affected trees were stressed by the drought in 1980. Combining such factors as drought, the two-lined chestnut borer and root rot, large numbers of oaks eventually succumbed and died. Where feasible, these dead trees are being salvaged for their usable lumber.

This report includes pests that have caused damage to urban and forest trees during 1982. Some of the pests destroy the ornamental value of trees while others cause log and lumber degrade, and timber loss.

As tree values increase each year, there is a great deal of interest in tree vigor and condition. Inquiries to our Forest District offices and Forest Pest Management group become more numerous each year. We serviced a great variety of inquiries involving insect and disease identification.

We saw the collapse of the looper complex in the spring of 1982. We still had a number of telephone calls about the insects, even though it was not present. A small infestation did exist in north St. Louis. The variable oak leaf caterpillar showed itself on foliage of individual oak trees in several urban areas, but was not a significant forest defoliator in 1982. Because of the adequate moisture situation in the state, pine wilt disease was not a serious problem of Scotch pine.

Many disease problems developed during spring and summer of 1982, due to the scattered frequent rainfall and high humidity. Conditions were ideal for the development and spread of needle and leaf fungi. Canker problems affected hardwood trees.

Final reports from U.S.D.A, A.P.H.I.S., indicate it appears that spraying of over 1,500 acres of forest land near Hardy, Arkansas, this April (1982), succeeded in snuffing out the small gypsy moth spot infestation located there. No male moths were trapped in this area during the 1982 season.

THE PROGRAM

In 1962, a cooperative program, the Forest Pest Control Program, was entered into with the U.S. Forest Service by the Forestry Division, Missouri Department of Conservation. Under the original agreement, the effort is designed to detect, evaluate, and control forest insects and diseases on state and private land. Department Foresters and other personnel report occurrences of damaging insects and diseases. Forest Pest Management specialists coordinate the program.

Drought, diseases, and insects can cause damage to trees and shrubs which goes unnoticed until mortality occurs. Scattered tree losses occur on an annual basis in the forest from root rots, vascular diseases, hardwood borers, pine cambial feeders, defoliating insects and drought.

Many kinds of factors produce stresses upon trees. Trees under stress are vulnerable to attack by a host of canker diseases, root rots and insect borers. Some factors which stress trees are drought, compacted soil, root disturbance, lightning strike, lack of nutrients, and wet soil conditions to list just a few.

Maintaining tree vigor is the most important consideration to insuring a long life.

CONDITIONS IN BRIEF

The growing season of 1982 came close to being more "normal" than we have seen in many years. Although we saw no rain in July, and it was hot and humid in early August, we were above normal in rainfall amounts from the very beginning of spring. By the end of December (1982), soil over the state was in a super-saturated state caused by excess rainfall in the early part of the month. Walnut production was excellent in most regions of the state as was acorn production in both the black and red oak group as well as the white oaks.

The bronze birch borer continued to cause mortality of white birches over the state. Because soil was not as dry to predispose white birches to attacks by the bronze birch borer, decline and mortality was not as conspicuous as in 1980. Likewise, the same can be said of pine wilt disease. We just didn't have large numbers of Scotch pine die in 1982, as we did in 1980.

The looper complex collapsed this spring and we saw very little of the variable oak leaf caterpillar during late summer.

All pests in this report have been observed by our Department Foresters, other Department personnel, Ramon D. Gass, Forest Entomologist, and Dr. Patricia E. Gowen, Forest Pathologist.

* * * * * * *

Gypsy Moth - During June, July, and August, 1982, fourteen male moths were recovered from traps in west and north St. Louis County. Personnel of the State Department of Agriculture in cooperation with U.S.D.A, A.P.H.I.S., located and monitored over 3,700 traps. Other cooperators were the National Campers and Hikers Association, Department of Natural Resources, Parks and Historical Preservation Division, the University of Missouri, Entomology Department, and John Grinstead at Fort Leonard Wood.

Variable Oak Leaf Caterpillar - Appeared this year only as a nuisance on scattered oak ornamentals producing light to medium defoliation.

Looper Complex - Collapsed over most of its range with the exception of north St. Louis.

True Tree Grasshopper - Was present, but caused no noticeable defoliation in south and south central Missouri.

Eastern Tent Caterpillar - Was heavy where eastern black cherry grows. There were as many as ten webs in some trees and defoliation was complete.

Fall Webworm - Was reported from a number of counties in 1982, however, webbing and defoliation was light.

European Pine Sawfly - Populations and defoliation was heavy in scattered locations in 1982 on Scotch and Mugho pines.

Loblolly and Redheaded Pine Sawflies - Remained at 1981 levels in 1982, with defoliation being light to moderate in scattered locations.

Evergreen Bagworm - Occurred statewide on ornamental cedars, but was not severe.

FOREST DISEASES

Actinopelte Leaf Spot - was widespread on pin, black, scarlet and Northern red oak. Most reports received were from the western part of the state.

Annosus Root Rot - caused dieback in one shortleaf pine stand in southern Missouri.

Anthracnose - affected ash, maple, oak, walnut, elm and sycamore during 1982, but was not as severe as in previous years.

Brown Spot Needle Blight - was widespread and severe on Scotch pine in Christmas tree plantations.

Diplodia Tip Blight - continued to be a major problem of Austrian pine trees more than 30 years old.

Dothiorella Canker of Oak - continued to be a problem of pin and Northern red oak, but was less widespread and severe than in 1981.

Hypoxylon Canker of Oak - dieback associated with Hypoxylon canker and the two-lined chestnut borer was not as widespread or serious as in 1981.

Maple Decline - continued to afflict maples in urban areas.

Naemacyclus Needlecast - was widespread, but not as serious as in 1981. Scotch was the main species of pine affected by Naemacyclus needlecast.

Oak Wilt - was a scattered problem of Northern red and black oak.

Pine Wilt Disease - was reported for jack and Scotch pine, but was not a serious problem.

Rhizosphaera Needelcast - was a scattered, minor problem of blue spruce.

Verticillium Wilt - was widespread and serious, reported as affecting elm, maple, oak, ash, and Russian olive.

Winter Injury to Scotch Pine - appeared during late winter and spring of 1982, as a result of extreme winter temperatures and high winds.

PROJECTS

The cooperative team effort of Department foresters and Forestry Division staff specialists resulted in a well-coordinated, successful Forest Pest Management Program again during 1982. Over 2,000 forest and shade tree requests were serviced statewide in 1982. Staff specialists were available to all who sought their assistance. In May and early June, seven regional Pest Management sessions were held for all Department foresters and personnel from other forestry related agencies. A total of 97 people attended these one-day meetings. Staff specialists serviced over 1,000 pest related telephone calls. Over 800 diagnoses were made for the state. No serious pest problems were found during visits to the George O. White State Forest Nursery or various natural areas.

Gass and Gowen conducted detection and evaluation surveys on the major insect and disease problems in 1982, on 5,000,000 acres. Reports were prepared and submitted to the U.S. Forest Service.

A total of six Forest Insect and Disease Status Reports (April through September) were prepared and sent to all Missouri Christmas Tree Producers, most Department personnel, and other individuals, totaling 900 copies per month.

Gass and Gowen attended the Annual State Cooperators Meeting hosted by the U.S. Forest Service. Gass attended the Southern Gypsy Moth Conference at Crossnore, North Carolina. Gowen attended the 1982 Annual Meeting of the American Phytopathological Society in Salt Lake City, Utah.

This year Forest Pest Management had the assistance of a laboratory technician who made diagnoses, serviced telephone calls, and provided other related pest services.

Our Department, along with other state and federal agencies, composed a Gypsy Moth Coordinating Committee. The purpose of this committee is to promote transfer of gypsy moth information between agencies and serve as a nucleus for an Advisory Council some day in the future.

Forest Pest Specialists and District Foresters presented technical sessions to arborist groups and Missouri Park and Recreation Workshops in various regions of the state.

HARDWOOD DEFOLIATORS AND BORERS

Gypsy Moth - During the summer of 1982, the gypsy moth defoliated over 8 million acres in the northeast. Spot infestations developed in the mid-west and the west coast states, as well as in West Virginia, Virginia, and North Carolina. Personnel of the Missouri State Department of Agriculture found 14 male moths in west and north St. Louis County. To date, no spot infestations have been discovered in Missouri. According to scientists, the spot infestation near Hardy, Arkansas, was successfully eliminated. Over 1,500 acres were sprayed on April 27 and 28, in an attempt to halt the spread of the gypsy moth larvae near Hardy, Arkansas, only nine miles from our southern border.

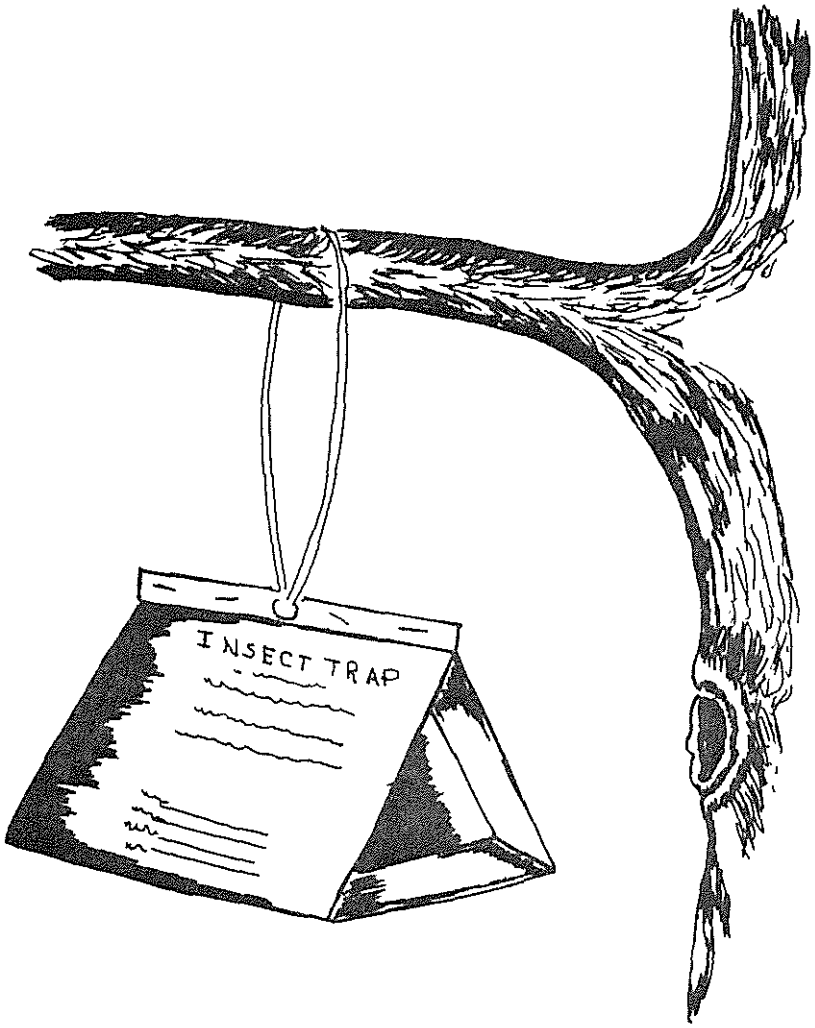
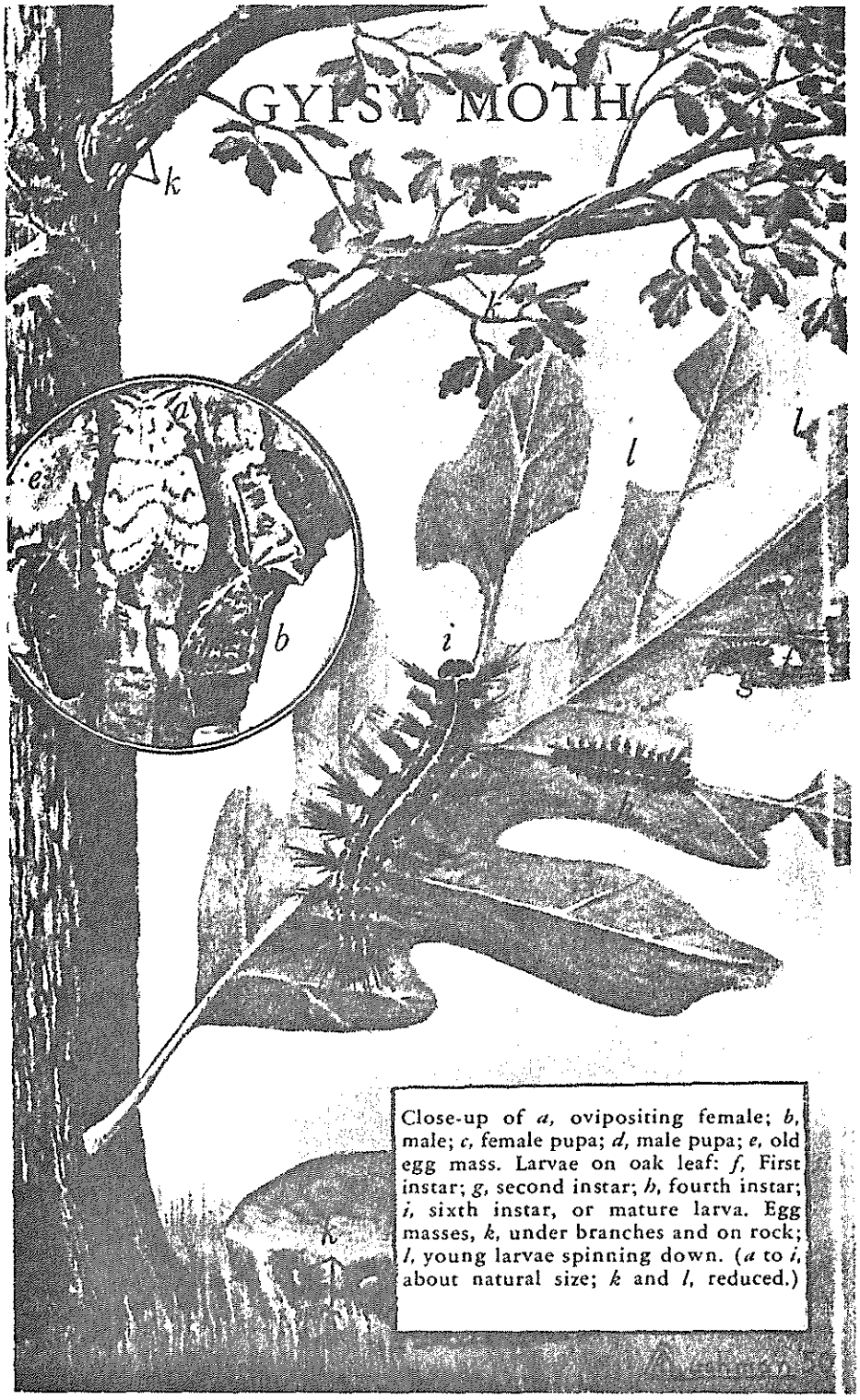


Figure 1. Gypsy Moth Trap


GYPSY MOTH
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Close-up of a, ovipositing female; b, male; c, female pupa; d, male pupa; e, old egg mass. Larvae on oak leaf: f, First instar; g, second instar; h, fourth instar; i, sixth instar, or mature larva. Egg masses, k, under branches and on rock; l, young larvae spinning down. (a to i, about natural size; k and l, reduced.)

Figure 2. Life Stages of the Gypsy Moth

The gypsy moth is not native to the United States, however, its life cycle does parallel that of a number of other insects. In spring and early summer, larvae feed on a great variety of hardwood foliage causing mortality. Mortality may result after three repeated defoliations. One defoliation can kill evergreen trees.

The gypsy moth overwinters in the egg stage in masses on bark, rocks, litter, or on man-made objects.

BN-33676

Egg masses on tree.

Figure 3. Gypsy Moth Egg Masses

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The Looper Complex - The extreme problem of 1981 did not materialize this spring. In past years, defoliating populations of the elm spanworm, Linden looper, spring cankerworm, oak leaf tiers, and oak leaf roller created problems for homeowners from central to east central Missouri. This complex of caterpillars stripped leaves from trees, leaving bare branches.

Due to virus, predation and other factors, populations collapsed in 1982. There was, however, a small area in north St. Louis that still was troubled in 1982 with the looper problem. The Calosoma beetle, by feeding on 1981 caterpillars, probably reduced the potential for large numbers of caterpillars in 1982.

Attachment #1

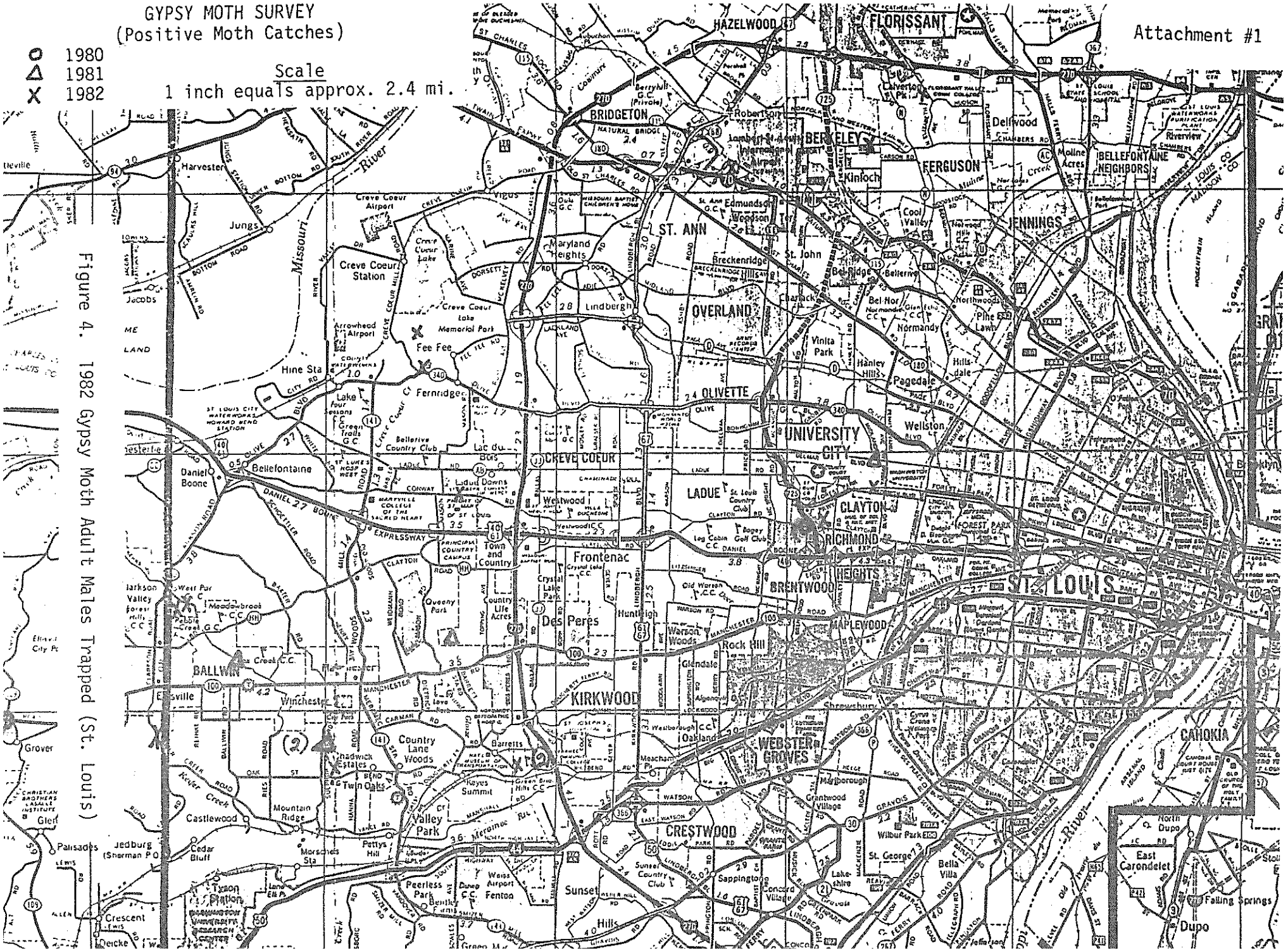

Figure 4. 1982 Gypsy Moth Adult Males Trapped (St. Louis)

Trend - Based on 1982 results, we probably will have low levels of the looper complex in 1983.

Suppression - No control was necessary.

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Variable Oak Leaf Caterpillar - Also collapsed on a forest wide scale. Between egg parasitism by the Telenomous wasp and a baculovirus, forest populations collapsed. We did see small infestations on individual shade trees around the state.

Trend - Populations will slowly build, eventually causing heavy defoliation on ornamental and forest oak trees. If natural forces are effective, however, populations will remain low for the next few years.

Suppression - No control work was required during 1982. Standard ornamental spray controls will be recommended if this insect does become damaging.

* * * * * * *

Fall Webworm - Was present this year in southwest Missouri causing light to moderate defoliation. No serious defoliation occurred anywhere in the state. Where the insect was present, it occurred on walnut, persimmon, hickory, sycamore, and several other species.

Trend - Light to moderate webbing should occur in 1983.

Suppression - Individual web control was conducted by owners of shade trees and nut orchards.

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Walnut Caterpillar - and other Datana species occurred in large numbers over the state in 1982, on scattered trees. The walnut caterpillar infested walnuts and hickories while other Datanas fed upon foliage of sumac and post, black and red oaks over the state. The defoliation of isolated single saplings along roadsides was very conspicuous.

Trend - 1983 levels will probably compare with those of 1982.

Suppression - a number of nut growers sprayed their trees to prevent infestation with recommended insecticides.

True Tree Grasshopper - Was present in south Missouri, however, defoliation was very light on hardwood trees.

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HARDWOOD BORERS

Two-Lined Chestnut Borer - Has captured most of our attention for the past three or four years because of its role in oak mortality. This insect typically attacks weakened oak in south Missouri where moisture stress has been a problem. Beginning in 1978, and through 1980, moisture was the limiting factor to tree growth which triggered attacks by the two-lined Chestnut borer. Late frost damage and droughty sites were also partially responsible for oak and hickory mortality.

Although moisture amounts are presently adequate and have been since 1981, oak trees are still dying in the forest as a delayed reaction from the drought period. We will continue to lose oaks for another several years. Entomologists have determined that the two-lined Chestnut borer also is attracted to oak trees in the northeast United States which have been stressed by repeated defoliations of the gypsy moth.

Trend - Most Ozark soils tend to have droughty characteristics. Whenever precipitation is deficient in forested areas and trees are stressed, the two-lined chestnut borer will continue to kill trees.

Suppression - Special attention should be paid to drought hazard sites during prolonged drought periods. These sites should be identified and the stand manipulated accordingly. Special management prescriptions should be used on droughty areas or hardwood sites with shallow soil and a hardpan. In some cases, even aged management in hardwoods may be in order, while other areas may best be clear cut and converted to shortleaf pine in it natural range.

The selection system could be used to reduce basal area, favoring the more drought tolerant species, using a shorter rotation. It may be desireable to grow a normal basal area volume per acre and use the entomological and pathological rotation.

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Bronze Birch Borer - Although not as dramatic as during dry years, still continues to infest and kill ornamental white birch trees over the state. In the past, drought conditions predisposed most trees causing them to be susceptible to attacks from the bronzed birch borer. This insect, like its counterpart, the two-lined chestnut borer, tends to be a secondary attacker and will attack trees in a weakened, declining condition. The larvae develop and feed between the bark and wood, girdling the tree, thus killing it.

The Carpenterworm, Red Oak Borer - and other living tree hardwood borers, as a part of our natural entomological heritage, continue to infest hardwood trees in forested areas of the state. Hardwood borers are a major problem on many hardwood trees in the urban scene.

Trend - Infestation will continue to occur in trees on poor sites. Estimated dollar loss to hardwood borer degrade exceeds $1,000,000 annually.

Suppression - Stand conversion, selection tree harvest and sanitation harvest was conducted in various timber sales over the state. Some shade tree owners controlled borers in high value trees over the state.

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The Cottonwood Twig Borer, Cottonwood Borer, Cottonwood Leaf Beetle, and Poplar Tent Maker - Continue to infest cottonwood where it grows. Borer damage is greater on trees growing on poor sites. Defoliation by the Poplar Tent Maker occurs almost everywhere cottonwood grows.

Trend - No increase in infestation is anticipated in 1982.

Suppression - No control was conducted for any of these pests in 1982. If damage appears too imminent, recommended controls will be used.

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Pine and Cedar Trunk Borers, Twig Borers and Defoliators

White Pine Aphid - Infested numerous white pine in many counties in 1982. Colonies were numerous and large on many ornamental trees. Some of the feeding caused yellowing of needles, however, generally overall, damage was minimal. This was the year (1982) of the aphid on hardwood trees and shrubs, as well as white pine.

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Pine Needle Scale - Was also bothersome especially on Scotch pine being grown for Christmas trees, as well as ornamentals. The St. Louis and Kansas City areas reported that Mugho pines were also infested.

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Nantucket Pine Tip Moth and Related Species - Populations were very light again in 1982. Scattered shortleaf pine plantings out of the natural range were light to moderately infested by the third generation of tip moth in late summer.

Trend - 1983 populations will probably be low to moderate.

Suppression - No feasible controls are available to plantation owners.

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Pales Weevil - Infested Scotch pine Christmas trees were reported from several counties in 1982. Damage was light and comparable to that of 1981. A very small amount of flagging occurred and was no cause for concern by growers.

Trend - This insect will continue to infest scattered plantations where cultural and chemical controls are not employed.

Suppression - Some producers continue to treat their stumps with chemicals to discourage egg laying. The recommended control is to remove new stumps or spray new stumps in March with Thiodan and diesel fuel.

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Black Turpentine Beetle - Infested shortleaf pine in a number of counties in 1982. Lightning struck and drought predisposed trees attracted beetles in several cases. Single trees were infested. Statewide infestation was endemic.

Trend - Light infestations are predicted where shortleaf pine have been disturbed or are in a weakened condition.

Suppression - Where infestations occur, recommendations are to fell trees and either salvage or burn them.

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Evergreen Bagworm - Populations were moderate to heavy on unprotected cedars and ornamental evergreen trees and shrubs including blue spruce and white pine. In natural cedar stands, predators eventually control bagworm infestations.

Trend - Moderate defoliation will occur in 1983, wherever ornamental evergreens grow.

Suppression - Many homeowners with evergreens had them sprayed or hand-picked the bags themselves. Various recommended insecticides were used to control bagworms on a wide scale.

European Pine Sawfly - Infested Scotch pine in plantations and ornamental plantings in numerous counties in 1982. Infestations ranged from light to heavy, causing substantial defoliation which required treatment.

Trend - Populations will continue to be bothersome in 1983, with defoliation being moderate to heavy.

Suppression - A number of growers used recommended insecticides on their trees to control this insect.

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The Loblolly Pine Sawfly - Occurred in a number of counties in south Missouri in 1982. Defoliation involved several limbs of individual trees, so damage was light to moderate.

Trend - Populations will be light to moderate during 1983.

Suppression - Where small ornamental pines were affected, owners hand-picked colonies.

* * * * * * *

Redheaded Pine Sawfly - Occurred on planted shortleaf pine in a number of counties in south Missouri. Defoliation was light in most areas on planted shortleaf pine.

Trend - Populations will remain at an endemic level in 1983.

Suppression - Limited control work was conducted on plantings around Department of Conservation Tower Sites. Some owners controlled individual colonies on their ornamentals using the recommended insecticides.

* * * * * * *

FOREST AND ORNAMENTAL TREE DISEASES

Actinopelte Leaf Spot - This disease occurred mainly in the western part of the state, affecting black, pin, scarlet and Northern red oak. Most reports received during July and September indicated a high level of disease severity.

Trend - Actinopelte leaf spot is an endemic disease, which may reach high levels in summers following wet springs.

Suppression - Raking and removing fallen leaves, and pruning off some branches to promote air movement, should help to control the disease. Affected trees should be fertilized to increase vigor.

Brown Spot Needle Blight - As in 1981, brown-spot needle blight was widespread and severe on Scotch pine in Christmas tree plantations. In most cases, symptoms appeared during late July and early August.

Trend - Brown-spot needle blight will continue to be a problem of Scotch pine in Christmas tree plantations, especially during years of abundant spring moisture.

Suppression - Spray in the spring (April-May) when new needles are half-grown and once again 3 to 4 weeks later with Bordeaux mixture 8-8-100 or fungicides containing chlorothalonil.

* * * * * * *

Naemacyclus Needlecast - Was widespread in 1982, affecting Scotch pine wherever it occurred. Symptoms of Naemacyclus needlecast were observed for the first time on Austrian pine. Most reports of the disease were received during August and September.

Trend - Naemacyclus needlecast will continue to be a statewide problem. Rainy springs can be expected to increase disease severity.

Control - Spray with a conifer fungicide containing chlorothalonil, or Manzate D, in mid-April and early May.

* * * * * * *

Oak Wilt - Was a scattered problem in 1982. Bur, Northern red, and black oaks were affected. The disease was mostly a problem of large, individual shade trees.

Trend - The disease is probably endemic in Missouri. Occassional losses of forest and urban trees can be expected to occur in the future.

Suppression - At the present time, removal of trees afflicted with oak wilt is the most practical means of control. Healthy oaks should not be wounded (this includes pruning) from midwinter to early summer, to avoid attracting sapfeeding insects carrying the oak wilt fungus.

* * * * * * *

Pine Needle Rust - Was widespread on young loblolly and shortleaf pine trees during the spring of 1982. Damage was minor.

Trend - Due to the large amount of fungus inoculum produced in 1982, the disease will probably be observed over the next several years on young loblolly and shortleaf pine.

Suppression - Destroy asters and goldenrods (the alternate hosts of the pine needle rust fungus) within 1,000 feet of susceptible trees before August.

* * * * * * *

Verticillium Wilt - Was widespread during 1982, reported as affecting elm, maple, oak, ash, and Russian olive. Most reports of the disease involved ornamental, not forest trees.

Trend - Verticillium wilt will continue to cause occasional losses of shade trees.

Suppression - Plant species resistant to Verticillium wilt on sites having a past history of the disease.

* * * * * * *

CONCLUSION

So to speak, we are in the lull before the raging storm. Pest problems during 1982 in Missouri were not spectacular or dramatic, but there were many scattered incidences of leaf and needle disease problems as well as defoliation.

More attention is being paid to the advent of the gypsy moth in the state than ever before. This dragon in the forests of the northeast is extending its territory to the midwestern and western states. How long it will be before it is a serious pest in Missouri is only speculation at this time. We are in the period now of education and vigilance through State Department of Agriculture's gypsy moth trapping program. When infestations do develop, efforts will be made to eliminate them.

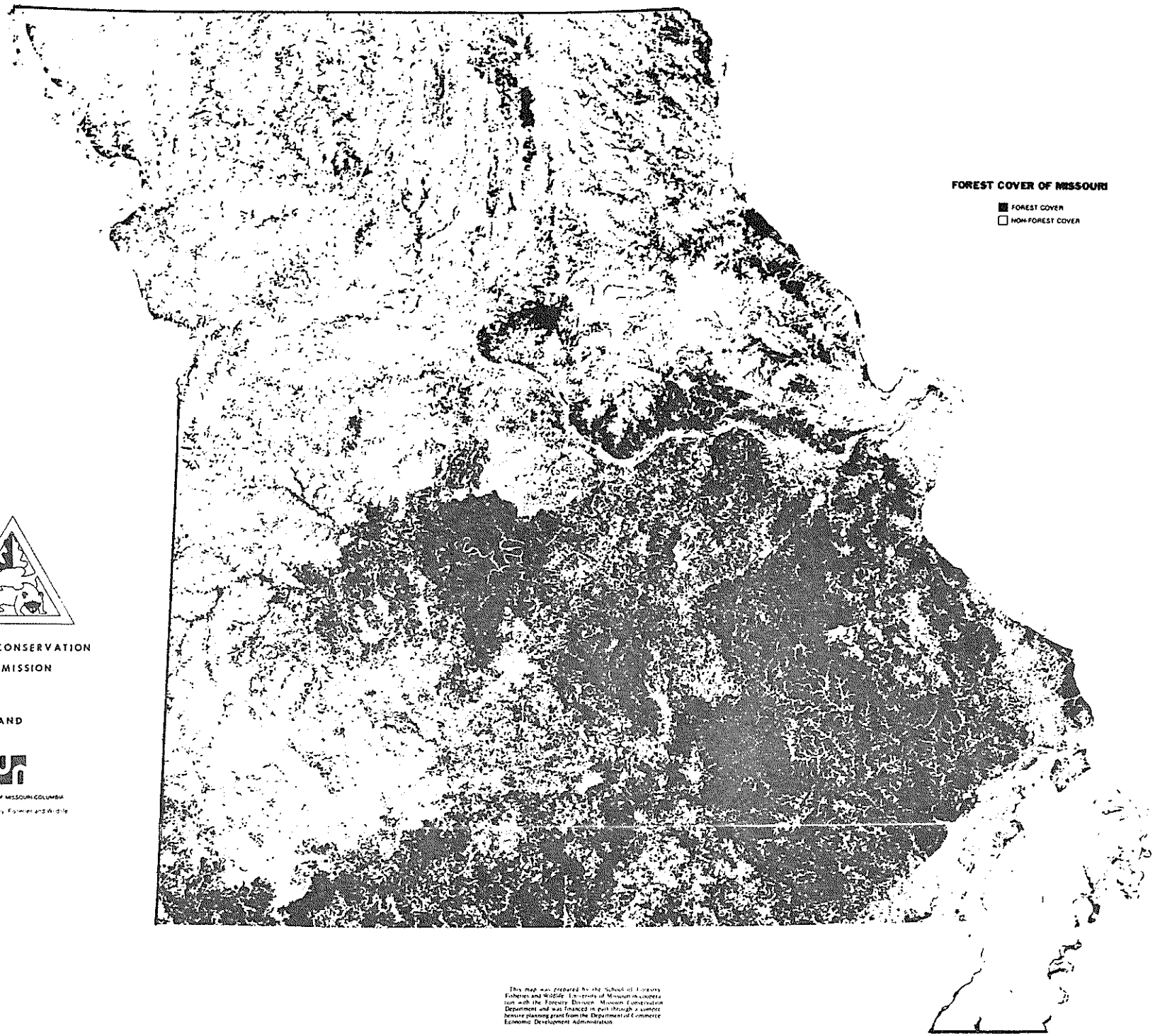
We are going into the 1983 growing season with adequate soil moisture. This is beneficial to trees and shrubs and stress should be at a minimum. Pine wilt damage and bronze birch borer infestations should not be as serious as during drought periods.

We will be going into our second season with the cooperative Integrated Pest Management (IPM) Program with the University of Missouri-Columbia. This multi-state reporting program has been developed to gather and computerize pest occurrence data for most plant pests in the state. Forestry is reporting their results to the IPM program for incidence of diseases and insects on forest and ornamental trees.

Without the cooperation of our foresters, we could not have collected this state-wide pest incidence information.

The most significant and personally rewarding of all activities was working with our foresters and with the public, and providing service to all who sought answers to their pest problems.

The key to our successful Forest Pest Management Program has been cooperation.

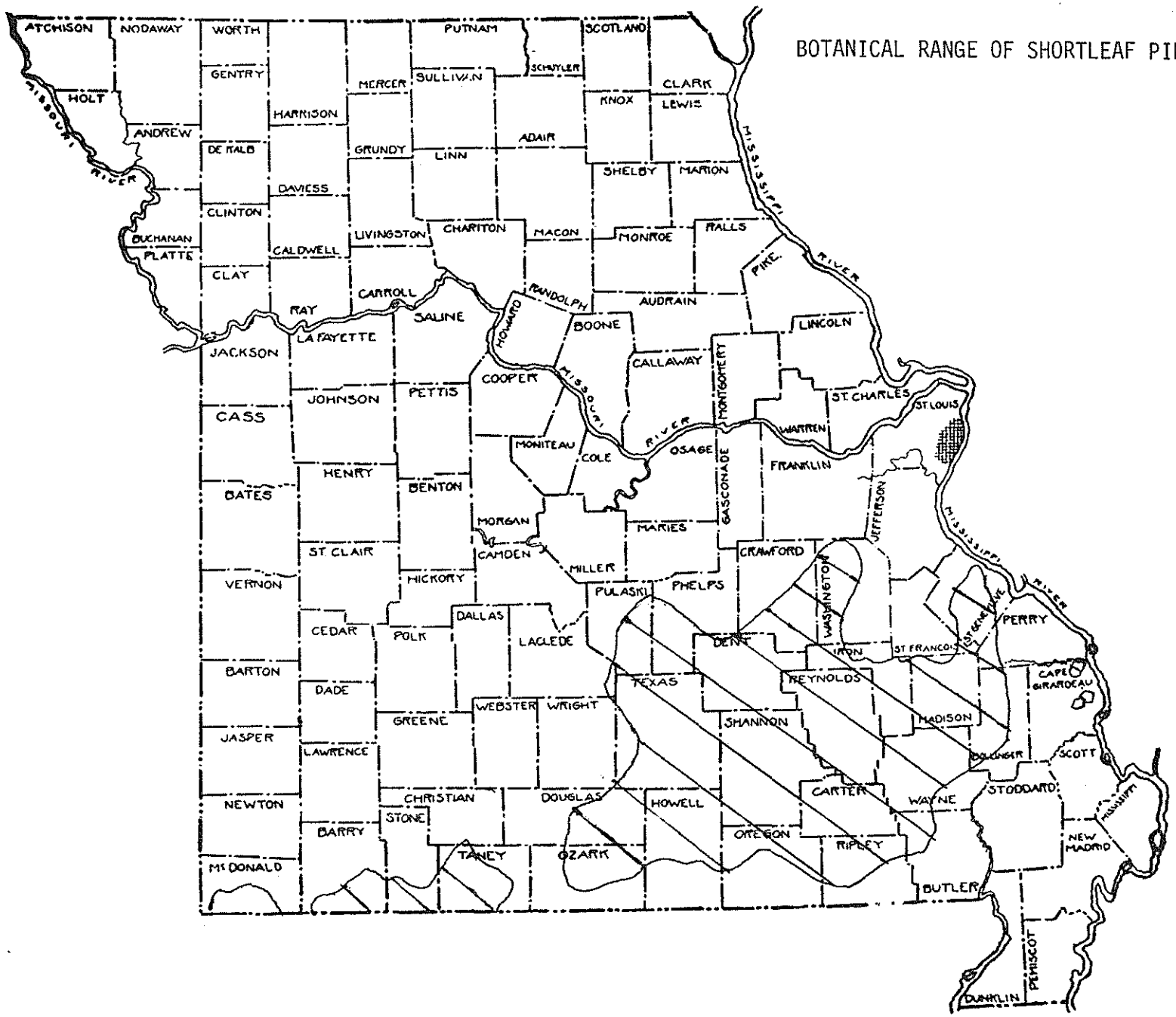


MISSOURI CONSERVATION COMMISSION

AND

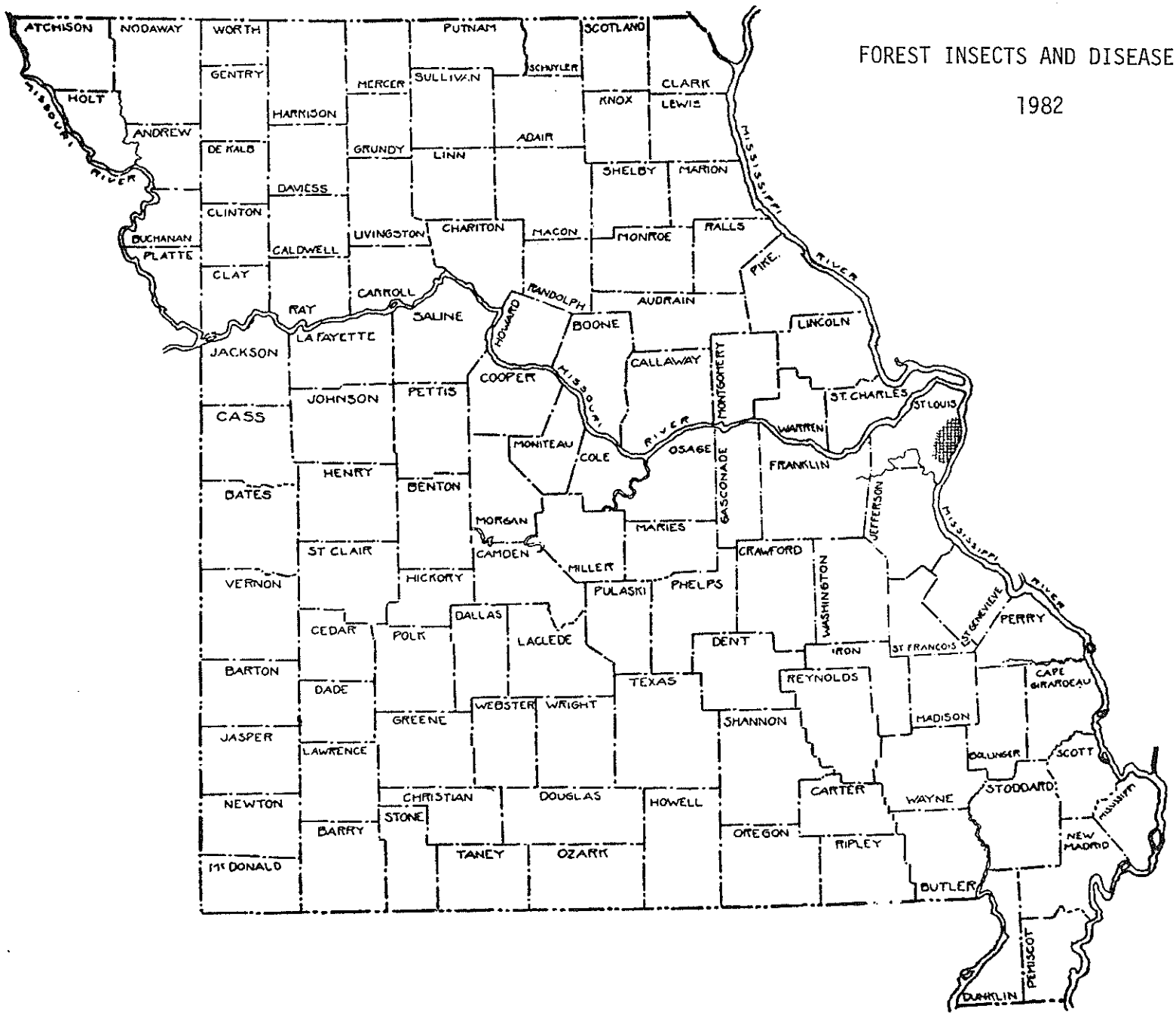
UNIVERSITY OF MISSOURI-COLUMBIA
School of Forestry, Fisheries and Wildlife

This map was prepared by the School of Forestry, Fisheries and Wildlife, University of Missouri in cooperation with the Forestry Division, Missouri Conservation Department and was financed in part through a summer intensive planning grant from the Department of Commerce Economic Development Administration.


BOTANICAL RANGE OF SHORTLEAF PINE
ATCHISON
NODAWAY
WORTH
PUTNAM
SCOTLAND
GENTRY
SCHUYLER
CLARK
HOLT
MERCER
SULLIVAN
KNOX
LEWIS
HARRISON
ANDREW
ADAIR
DE KALB
GRUNDY
LINN
SHELBY
MARION
DAVIESS
CLINTON
LIVINGSTON
CHARITON
MACON
MONROE
RALLS
BUCHANAN
CALDWELL
PLATTE
CLAY
CARROLL
RANDOLPH
PIKE
RAY
SALINE
AUDRAIN
HOWARD
BOONE
LINCOLN
LAFAYETTE
JACKSON
CALLAWAY
COOPER
MONTGOMERY
JOHNSON
PETTIS
ST CHARLES
ST LOUIS
CASS
MONITEAU
COLE
OSAGE
WARREN
FRANKLIN
HENRY
BENTON
GASCONADE
BATES
MORGAN
MARIES
JEFFERSON
ST CLAIR
CAMDEN
CRAWFORD
MILLER
VERNON
HICKORY
PULASKI
PHELPS
WASHINGTON
PERRY
CEDAR
POLK
DALLAS
LACLEDE
DENT
IRON
ST FRANCOIS
STE GENEVIEVE
BARTON
DADE
TEXAS
REYNOLDS
CAPE GIRARDEAU
GREENE
WEBSTER
WRIGHT
SHANNON
MADISON
JASPER
LAWRENCE
BOLLINGER
SCOTT
CHRISTIAN
DOUGLAS
HOWELL
CARTER
WAYNE
STODDARD
NEWTON
STONE
OREGON
RIPLEY
NEW MADRID
BARRY
TANEY
OZARK
MC DONALD
BUTLER
DUNKLIN
PEMISCOT
MISSOURI RIVER
MISSISSIPPI RIVER

FOREST INSECTS AND DISEASES

1982



PEST	COUNTY
Aphid	Benton, Boone, Buchanan, Butler, Camden, Clay, Crawford, Jackson, Morgan, Reynolds, Ste. Genevieve, Scott
Bagworms	Boone, Butler, Callaway, Camden, Christian, Franklin, Greene, Hickory, Iron, Jackson, Jasper, Jefferson, Laclede, Marion, Perry, Phelps, Reynolds, St. Charles, St. Francois, St. Louis, Stone, Taney
Black Turpentine Beetle	Butler, Phelps, Reynolds, Shannon, Wayne
Borers	Adair, Andrew, Audrain, Boone, Buchanan, Butler, Camden, Crawford, DeKalb, Douglas, Dunklin, Franklin, Henry, Jackson, Jefferson, Miller, Morgan, Perry, Pettis, Platte, Putnam, St. Charles, St. Francois, St. Louis, Ste. Genevieve, Texas
Eastern Tent Caterpillar	Statewide where eastern black cherry occurs.
Elm Leaf Beetle	Barry, Barton, Buchanan, Greene, Jackson, Jasper, Jefferson, Lawrence, McDonald, Newton, St. Charles, St. Louis
European Pine Sawfly	Adair, Andrew, Barry, Camden, Lawrence, St. Louis
Fall Webworm	Adair, Barry, Barton, Butler, Camden, Christian, Clay, Clinton, Dallas, Greene, Henry, Hickory, Howell, Jackson, Jasper, Laclede, Lawrence, McDonald, Miller, Monroe, Morgan, Newton, Pettis, Phelps, St. Louis, Stone, Taney
Ips	Butler, Crawford, Jefferson, St. Charles, St. Louis
Lace Bugs	Boone, Buchanan, Butler, Jackson, Platte
Loblolly Pine Sawfly	Buchanan, Callaway, Dallas, Greene, Laclede, Ripley, Taney, Webster
Looper Complex	Buchanan, Carter, Clinton, Howell, Jackson, St. Louis
Oak Slug Sawfly	Buchanan, Ozark, Reynolds, Warren
Pales Weevil	Cass, Montgomery, St. Louis

PEST	COUNTY
Pine Needle Scale	Buchanan, Cape Girardeau, Jackson, Jefferson, Warren, St. Charles, St. Louis
Nantucket Pine Tip Moth	Butler, Howell, Laclede, Lawrence, Maries, Newton
Redheaded Pine Sawfly	Butler, Dent, Franklin, Gasconade, Greene, Iron, Laclede, Perry, Ripley, St. Francois, Stoddard, Stone, Taney
Scales	Boone, Buchanan, Camden, Jackson, Jefferson, Laclede, Mississippi, St. Charles, St. Louis; Ste. Genevieve
Spider Mites	Buchanan, Butler, Greene, Jackson, Laclede, Marion, Pike, St. Louis, Texas
Variable Oak Leaf Caterpillar	Camden, Stone, Taney
Walnut Caterpillar	Statewide where black walnut or hickory occurs.

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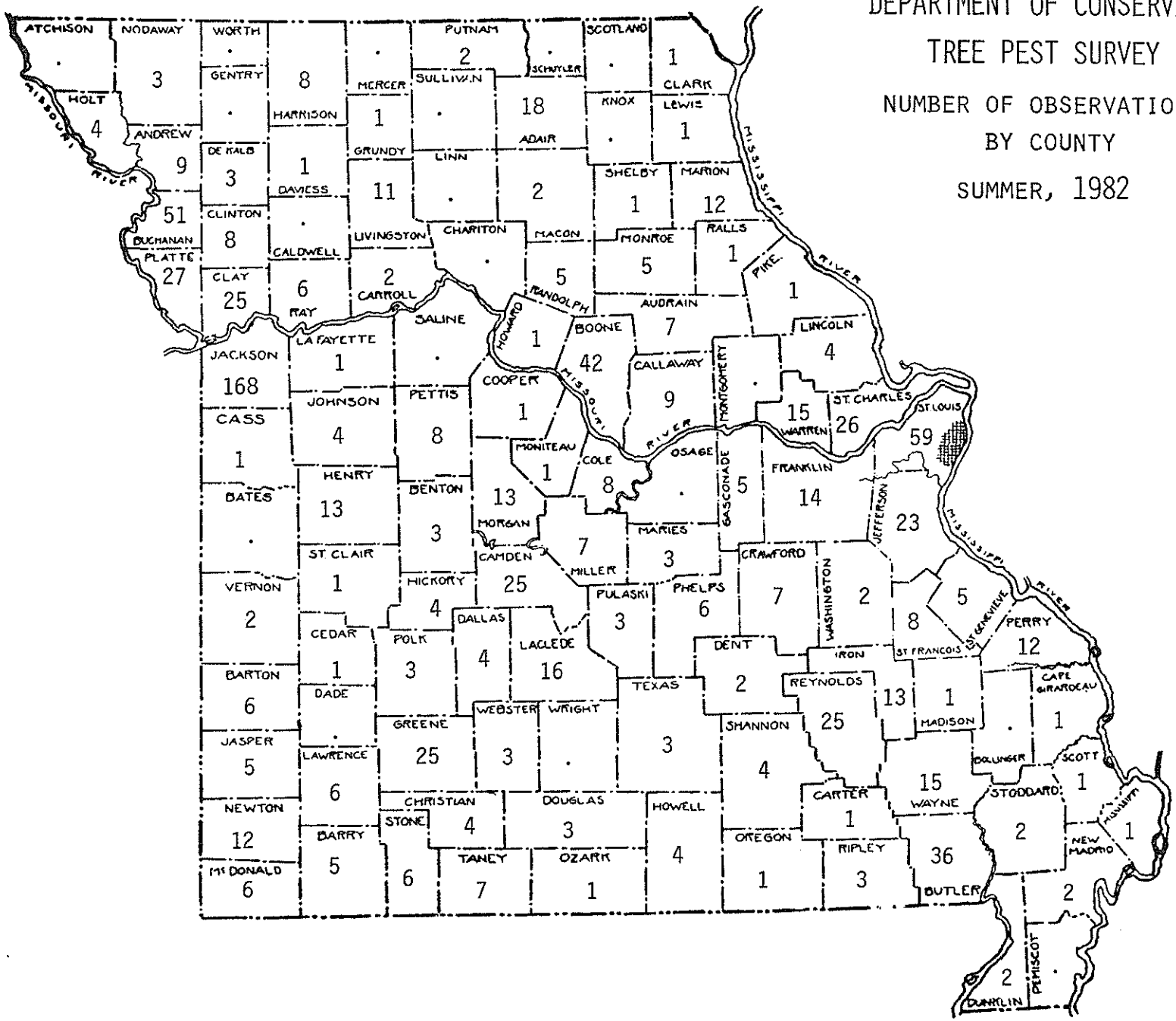
FOREST DISEASES	COUNTY
Apple Scab	St. Charles
Actinopelte Leaf Spot of Oak	Nodaway, Harrison, Livingston, Jackson, Henry, Barton, Newton, McDonald, Lawrence, Barry, Iron, Butler
Annosus Root Rot	Ripley
Armillaria Root Rot	Adair, Camden, Jackson, Livingston, Pettis, Randolph, Reynolds, St. Louis
Ash Anthracnose	Newton, Boone
Ash Decline	Warren, St. Charles, St. Louis, Jefferson, St. Louis City, Jackson, Newton
Bacterial Wetwood of Elm	Jackson, Buchanan, St. Louis, Franklin, Reynolds, Callaway, Clay, Laclede, Phelps

FOREST DISEASES	COUNTY
Black Knot of Plum and Cherry	Boone, Texas
Botryosphaeria Canker of Sweetgum	Buchanan
Brown Spot Needle Blight	Boone, Buchanan, Clay, Crawford, Greene, Harrison, Jackson, Marion, Perry, Pettis, Platte, Ray, Warren, Washington
✓Cedar-Apple Rust	Webster, Christian, Reynolds, Dent, Stone, Taney, Cass, Wayne, Jackson, Phelps, St. Louis, Greene, Howell, Marion, Shannon, Adair, Knox, Linn, Henry
Cytospora Canker of Poplar	Greene, Cole, New Madrid
✓Diplodia Tip Blight	Boone, Cole, Buchanan, Jackson, Barton, Clay, Greene, St. Louis, St. Louis City, Jefferson, St. Charles, Hickory, Adair, Randolph, Livingston
✓Dothiorella Canker of Oak	Holt, Cass, Howard, Cole
Dothistroma Needle Blight	Clinton, Boone, Henry, Livingston, St. Charles
Dutch Elm Disease	Butler, Daviess, Dent, Greene, Iron, Jackson, Jasper, Jefferson, Laclede, Moniteau, Perry, Reynolds, St. Charles, St. Louis, Wayne, Franklin,Newton, St. Louis City, Buchanan, Atchison, Holt, Andrew, Nodaway, Worth, Gentry, DeKalb, Harrison, Clinton, Chariton, Platte, Caldwell, Mercer, Grundy, Livingston, Carroll, Carter, Clay
Eastern Gall Rust	Butler, Reynolds, Ozark
Elm Phloem Necrosis	Crawford, Henry, St. Louis, Franklin
✓Fire Blight	Newton, Buchanan, Iron, Boone, St. Louis, Wayne, Andrew, St. Charles, St. Louis City
Fusarium Canker of Walnut	Lawrence
Hypoxylon Canker of Oak	Scotland, Camden, Miller, Morgan, St. Louis
Maple Anthracnose	Boone, Buchanan, Gasconade, Franklin
Maple Canker	Butler, St. Francois

FOREST DISEASES	COUNTY
Maple Decline	Iron, Reynolds, Wayne, Howell, St. Charles, St. Louis City, Jefferson, McDonald, Andrew, Boone, St. Louis, Franklin, Jackson, Perry, Adair, Buchanan, Marion, Ste. Genevieve, Callaway
Naemacyclus Needle Cast	St. Louis, Cole, Pulaski, Greene, Stone, Audrain, Boone, Callaway, Cooper, Jackson, Randolph, Sullivan, Maries, Osage, Clinton, Henry, Texas, Warren, St. Charles, Oregon, Gasconade, Jefferson, Butler
Nectria Canker	Butler, Atchison, Buchanan
Nectria Cinnabarina Canker	Cole
Oak Anthracnose	Buchanan, Adair, Livingston, Clinton
Oak Leaf Blister	Jackson, Newton
Oak Wilt	Monroe, Callaway, Adair, Knox, Macon, Linn, Henry, Iron, Reynolds, Boone, Jackson, Platte, Andrew, Nodaway, Lincoln, Webster, St. Louis, Harrison, Livingston, Buchanan, St. Clair, Benton, Audrain, Warren
Phomopsis Blight	DeKalb, Jackson, Cole, Camden, Putnam, Sullivan, Linn, Schuyler, Adair, Macon, Scotland, Knox, Texas, Crawford, Jefferson, St. Charles, St. Louis, St. Louis City, Boone, Henry, Clay Buchanan
Pin Oak Chlorosis	St. Charles, Buchanan, Marion, St. Francois, Adair, St. Louis, Lewis, St. Louis City, Jackson, Greene, Henry
Pine Needle Rust	Ozark, Franklin, Crawford, Osage, Shannon, Maries, Texas
Pine Wilt Disease	Boone, St. Louis
Powdery Mildew of Oak	St. Louis City
Rhizosphaera Needle Cast	Jackson, Butler, Cass, Buchanan, St. Louis, St. Louis City, St. Charles, Jefferson, Johnson, Adair, Clay
Smooth Patch of White Oak	Andrew
Sweet Gum Chlorosis	Wayne, St. Louis, St. Louis City, Jefferson, St. Charles

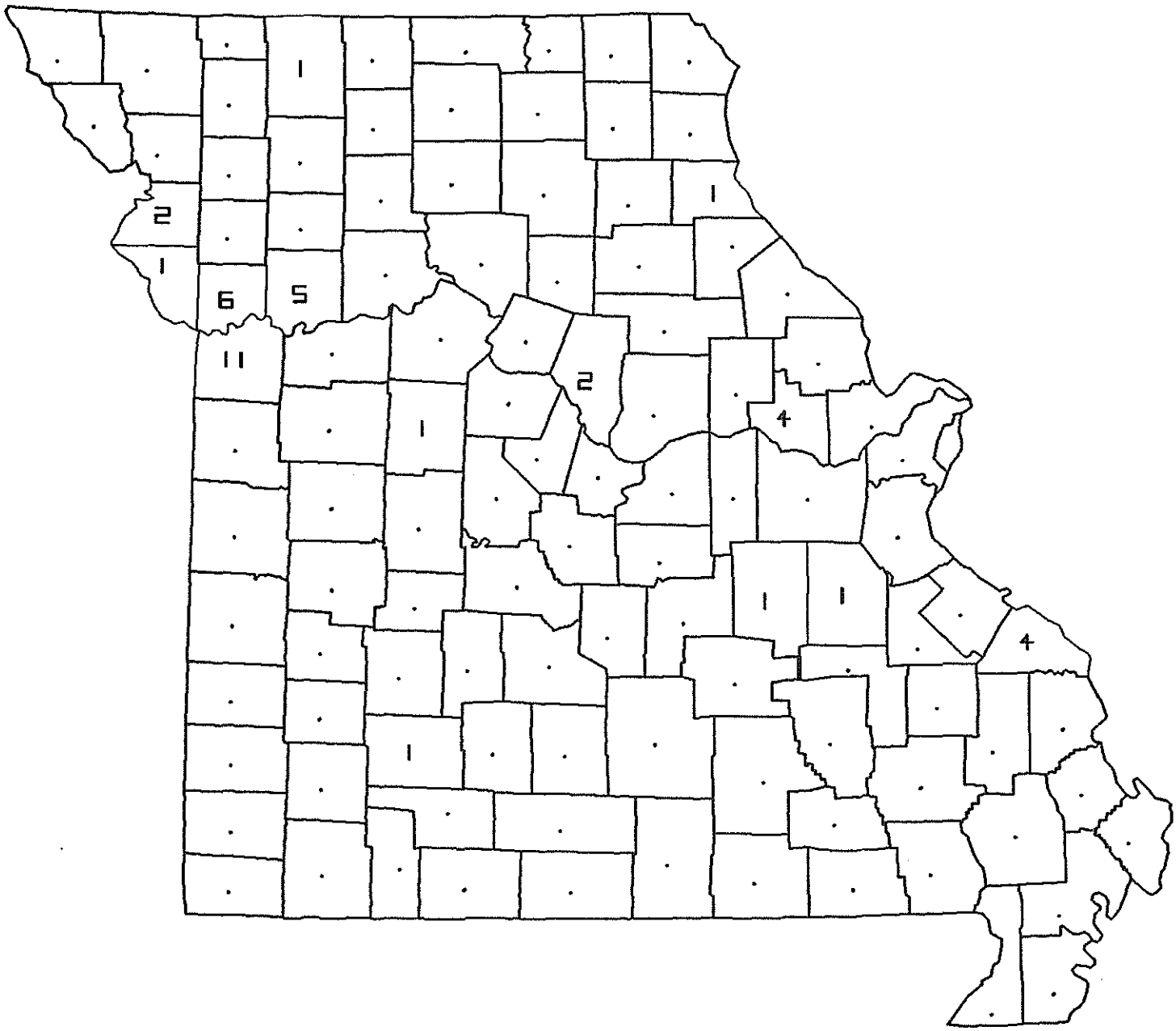
FOREST DISEASES	COUNTY
Sycamore Anthracnose	Knox, Putnam, Sullivan, Linn, Schuyler, Adair, Macon, Scotland, Buchanan, Jackson, Henry, New Madrid, Monroe, Reynolds, Wayne, Boone, Greene, Atchison, Holt, Andrew, Nodaway, Worth, Gentry, Daviess, DeKalb, Harrison, Clinton, Chariton, Platte, Caldwell, Mercer, Grundy, Livingston, Carroll Scott, Butler, Dade, Cedar, Polk
Verticillium Wilt	Perry, Cole, Boone, Jackson, St. Charles, Iron, Reynolds, Camden, Miller, Johnson, Buchanan, Marion
Walnut Anthracnose	Howell, Adair, Vernon
Western Gall Rust	Boone
White Pine Root Decline	Butler, St. Louis City
Winter Drying	Franklin, St. Louis, St. Charles, Jefferson, St. Louis City, Jasper, Henry, Jackson, Phelps, Adair, Atchison, Webster, Clay, Buchanan, Boone

DEPARTMENT OF CONSERVATION
TREE PEST SURVEY
NUMBER OF OBSERVATIONS BY COUNTY
SUMMER, 1982



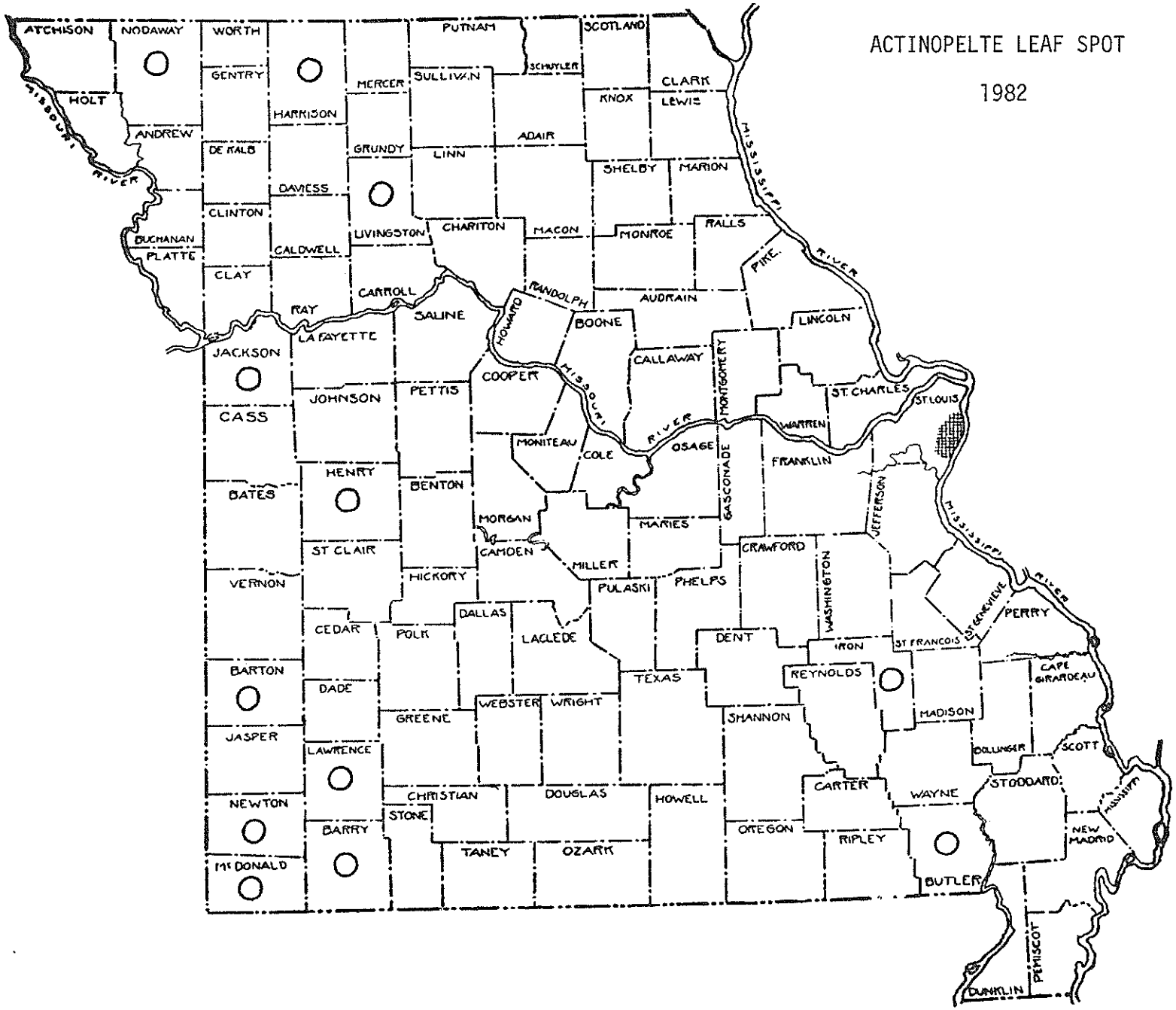
BROWN SPOT NEEDLE BLIGHT, MISSOURI 1982

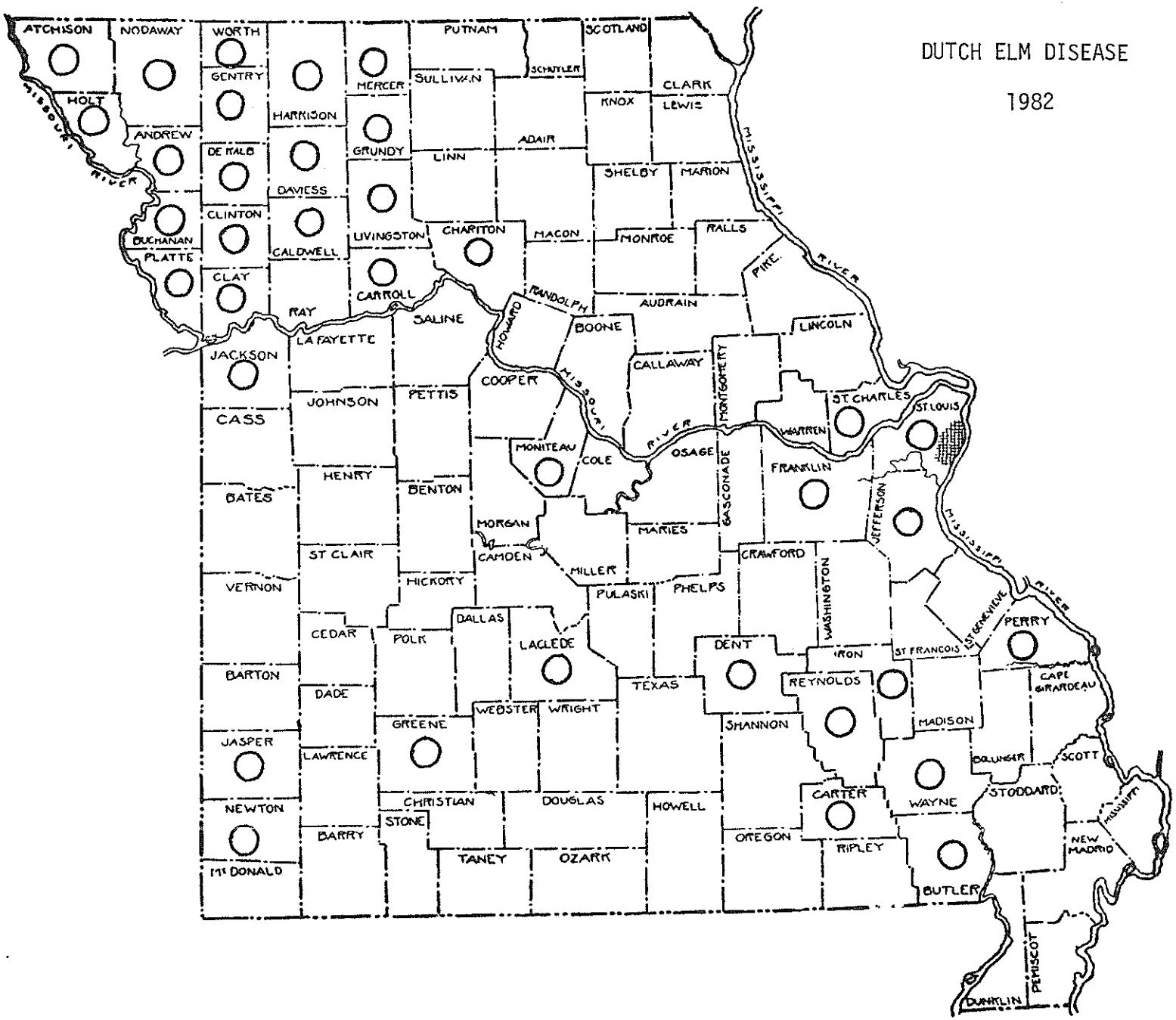
NUMBER OF REPORTS
BY COUNTY



BROWN SPOT NEEDLE BLIGHT, MISSOURI 1982

RELATIVE ABUNDANCE


ACTINOPELTE LEAF SPOT
1982
ATCHISON
NODAWAY
WORTH
PUTNAM
SCOTLAND
GENTRY
SCHUYLER
CLARK
KNOX
LEWIS
HOLT
MERCER
SULLIVAN
HARRISON
ANDREW
GRUNDY
LINN
ADAIR
DE KALB
SHELBY
MARION
DAVIESS
CLINTON
LIVINGSTON
CHARITON
MACON
MONROE
RALLS
BUCHANAN
CALDWELL
PLATTE
CLAY
CARROLL
RANDOLPH
AUDRAIN
PIKE
RAY
SALINE
HOWARD
BOONE
LINCOLN
LAFAYETTE
JACKSON
COOPER
CALLAWAY
MONTGOMERY
ST CHARLES
ST LOUIS
JOHNSON
PETTIS
CASS
MONITEAU
COLE
OSAGE
WARREN
FRANKLIN
HENRY
BENTON
BATES
MORGAN
MARIES
GASCONADE
JEFFERSON
ST CLAIR
CAMDEN
MILLER
CRAWFORD
VERNON
HICKORY
PULASKI
PHELPS
WASHINGTON
CEDAR
POLK
DALLAS
LACLEDE
DENT
IRON
ST FRANCOIS
STE GENEVIEVE
PERRY
BARTON
DADE
TEXAS
REYNOLDS
CAPE GIRARDEAU
GREENE
WEBSTER
WRIGHT
SHANNON
MADISON
JASPER
LAWRENCE
BOLLINGER
SCOTT
CARTER
WAYNE
STODDARD
CHRISTIAN
DOUGLAS
HOWELL
NEWTON
STONE
OREGON
RIPLEY
NEW MADRID
BARRY
TANEY
OZARK
McDONALD
BUTLER
DUNKLIN
PEMISCOT
MISSOURI RIVER
MISSISSIPPI RIVER


DUTCH ELM DISEASE
1982
ATCHISON
NODAWAY
WORTH
GENTRY
HARRISON
MERCER
PUTNAM
SULLIVAN
SCHUYLER
SCOTLAND
CLARK
KNOX
LEWIS
HOLT
ANDREW
DE KALB
DAVIESS
GRUNDY
LINN
ADAIR
SHELBY
MARION
CLINTON
CALDWELL
LIVINGSTON
CHARITON
MACON
MONROE
RALLS
BUCHANAN
PLATTE
CLAY
CARROLL
RANDOLPH
AUDRAIN
PIKE
RAY
SALINE
HOWARD
BOONE
LINCOLN
JACKSON
LAFAYETTE
CALLAWAY
COOPER
MONTGOMERY
JOHNSON
PETTIS
ST CHARLES
ST LOUIS
CASS
MONITEAU
COLE
OSAGE
WARREN
FRANKLIN
HENRY
BENTON
BATES
MORGAN
MARIES
GASCONADE
JEFFERSON
ST CLAIR
CAMDEN
MILLER
CRAWFORD
WASHINGTON
VERNON
HICKORY
PULASKI
PHELPS
CEDAR
POLK
DALLAS
LACLEDE
DENT
IRON
ST FRANCOIS
STE GENEVIEVE
PERRY
BARTON
DADE
TEXAS
REYNOLDS
CAPE GIRARDEAU
WEBSTER
WRIGHT
SHANNON
MADISON
JASPER
GREENE
LAWRENCE
BOLLINGER
SCOTT
CHRISTIAN
DOUGLAS
HOWELL
CARTER
WAYNE
STODDARD
NEWTON
STONE
BARRY
OREGON
RIPLEY
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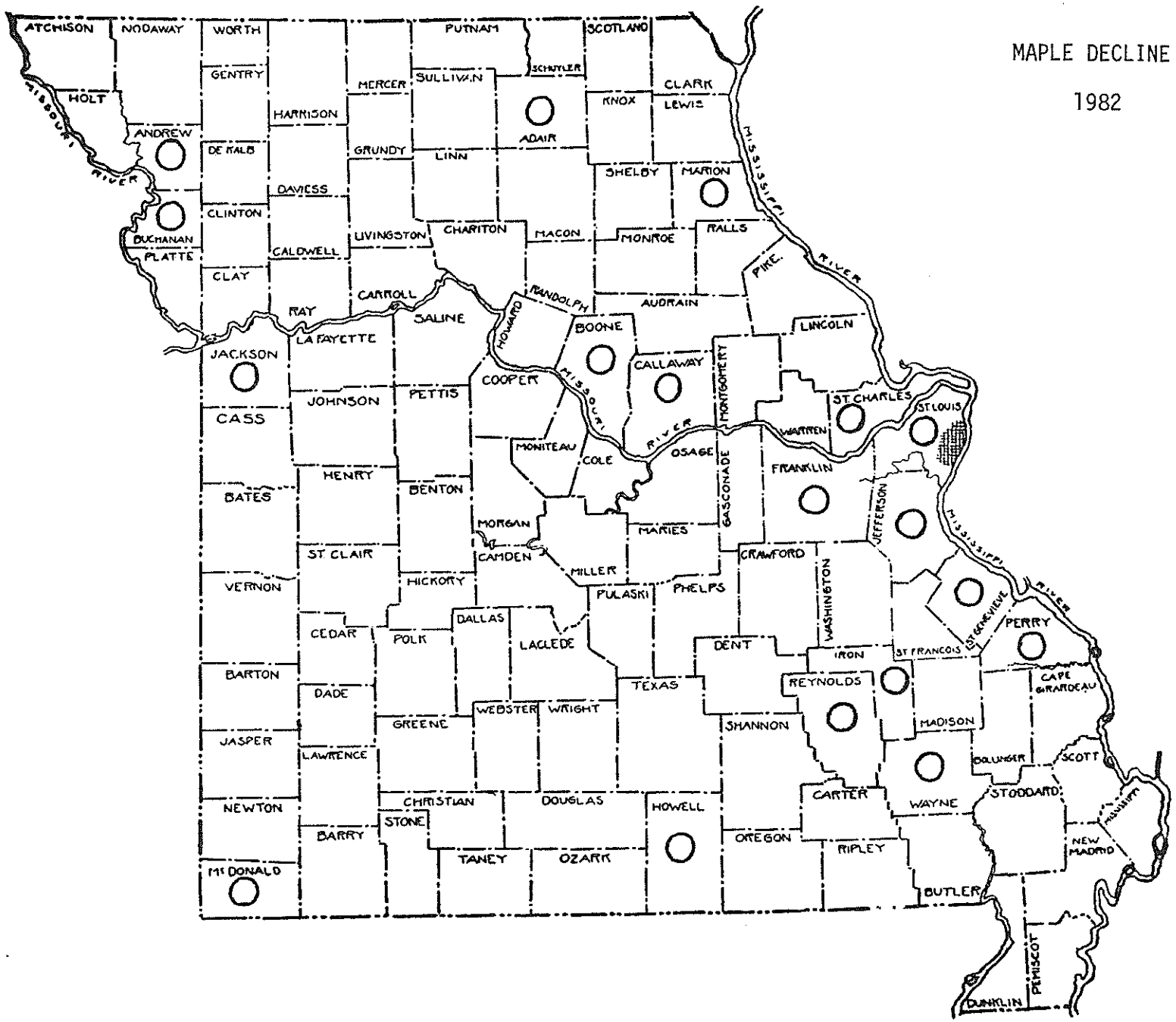
OZARK
Mc DONALD
BUTLER
DUNKLIN
PEMISCOT
MISSOURI RIVER
MISSISSIPPI RIVER


MAPLE DECLINE
1982
ATCHISON
NODAWAY
WORTH
PUTNAM
SCOTLAND
GENTRY
SCHUYLER
CLARK
MERCER
SULLIVAN
KNOX
LEWIS
HOLT
HARRISON
ADAIR
ANDREW
DE KALB
GRUNDY
LINN
SHELBY
MARION
DAVIESS
CLINTON
LIVINGSTON
CHARITON
MACON
MONROE
RALLS
BUCHANAN
PLATTE
CALDWELL
PIKE
CLAY
CARROLL
RANDOLPH
AUDRAIN
RAY
SALINE
HOWARD
BOONE
LINCOLN
LAFAYETTE
JACKSON
COOPER
CALLAWAY
MONTGOMERY
ST CHARLES
ST LOUIS
JOHNSON
PETTIS
CASS
MONITEAU
COLE
OSAGE
WARREN
FRANKLIN
HENRY
BENTON
BATES
MORGAN
MARIES
GASCONADE
JEFFERSON
ST CLAIR
CAMDEN
CRAWFORD
MILLER
VERNON
HICKORY
PULASKI
PHELPS
WASHINGTON
CEDAR
POLK
DALLAS
LACLEDE
DENT
IRON
ST FRANCOIS
STE GENEVIEVE
PERRY
BARTON
DADE
TEXAS
REYNOLDS
CAPE GIRARDEAU
GREENE
WEBSTER
WRIGHT
SHANNON
MADISON
JASPER
LAWRENCE
BOLLINGER
SCOTT
CHRISTIAN
DOUGLAS
HOWELL
CARTER
WAYNE
STODDARD
NEWTON
STONE
BARRY
OREGON
RIPLEY
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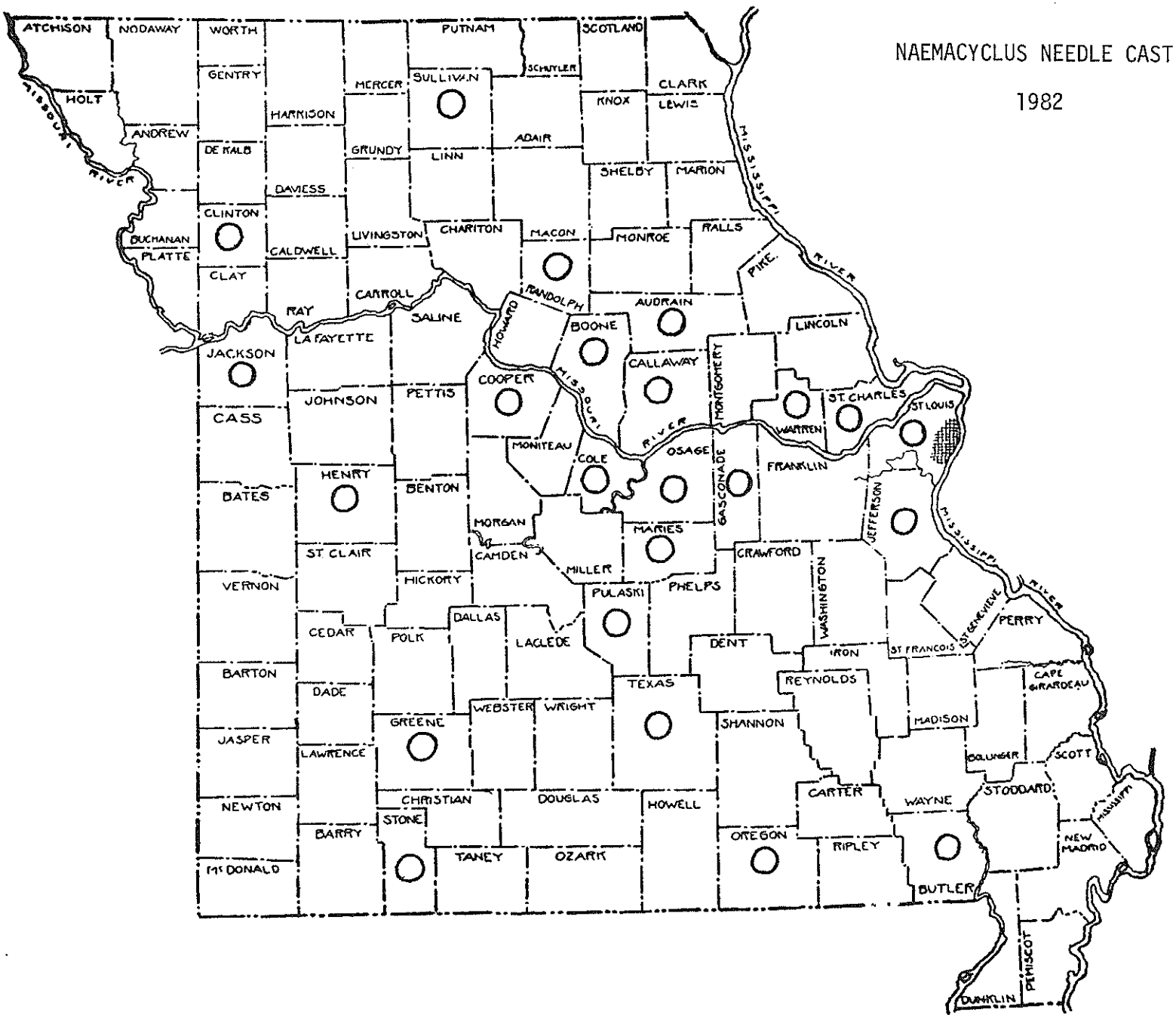
TANEY
OZARK
Mc DONALD
BUTLER
DUNKLIN
PEMISCOT
MISSOURI RIVER
MISSISSIPPI RIVER


NAEMACYCLUS NEEDLE CAST
1982
ATCHISON
NODAWAY
WORTH
PUTNAM
SCOTLAND
SCHUYLER
CLARK
KNOX
LEWIS
GENTRY
MERCER
SULLIVAN
HOLT
HARRISON
ANDREW
DE KALB
GRUNDY
LINN
ADAIR
SHELBY
MARION
DAVIESS
CLINTON
BUCHANAN
LIVINGSTON
CHARITON
MACON
MONROE
RALLS
PLATTE
CALDWELL
CLAY
CARROLL
RANDOLPH
AUDRAIN
PIKE
RAY
SALINE
HOWARD
BOONE
LINCOLN
JACKSON
LAFAYETTE
COOPER
CALLAWAY
MONTGOMERY
ST. CHARLES
ST LOUIS
JOHNSON
PETTIS
CASS
MONITEAU
COLE
OSAGE
WARREN
FRANKLIN
HENRY
BENTON
BATES
MORGAN
MARIES
GASCONADE
JEFFERSON
ST CLAIR
CAMDEN
CRAWFORD
MILLER
VERNON
HICKORY
PULASKI
PHELPS
WASHINGTON
PERRY
CEDAR
POLK
DALLAS
LACLEDE
STE GENEVIEVE
DENT
IRON
ST FRANCOIS
BARTON
DADE
TEXAS
REYNOLDS
CAPE GIRARDEAU
GREENE
WEBSTER
WRIGHT
SHANNON
MADISON
JASPER
LAWRENCE
BOLLINGER
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CARTER
WAYNE
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TANEY
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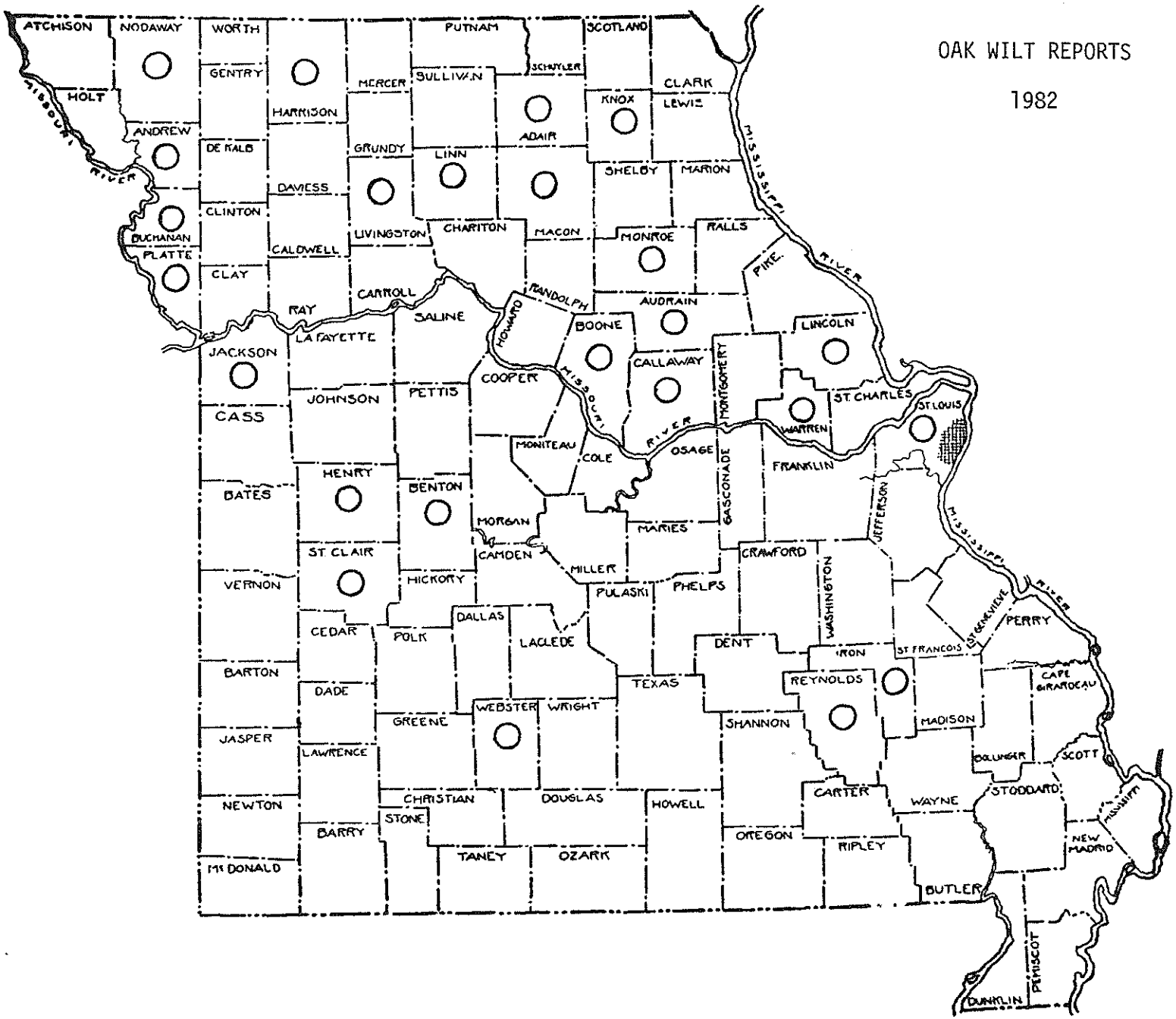
DUNKLIN
PEMISCOT
MISSOURI RIVER
MISSISSIPPI RIVER


OAK WILT REPORTS
1982
ATCHISON
NODAWAY
WORTH
PUTNAM
SCOTLAND
GENTRY
SCHUYLER
CLARK
HOLT
MERCER
SULLIVAN
KNOX
LEWIS
HARRISON
ADAIR
ANDREW
DE KALB
GRUNDY
LINN
SHELBY
MARION
DAVIESS
CLINTON
BUCHANAN
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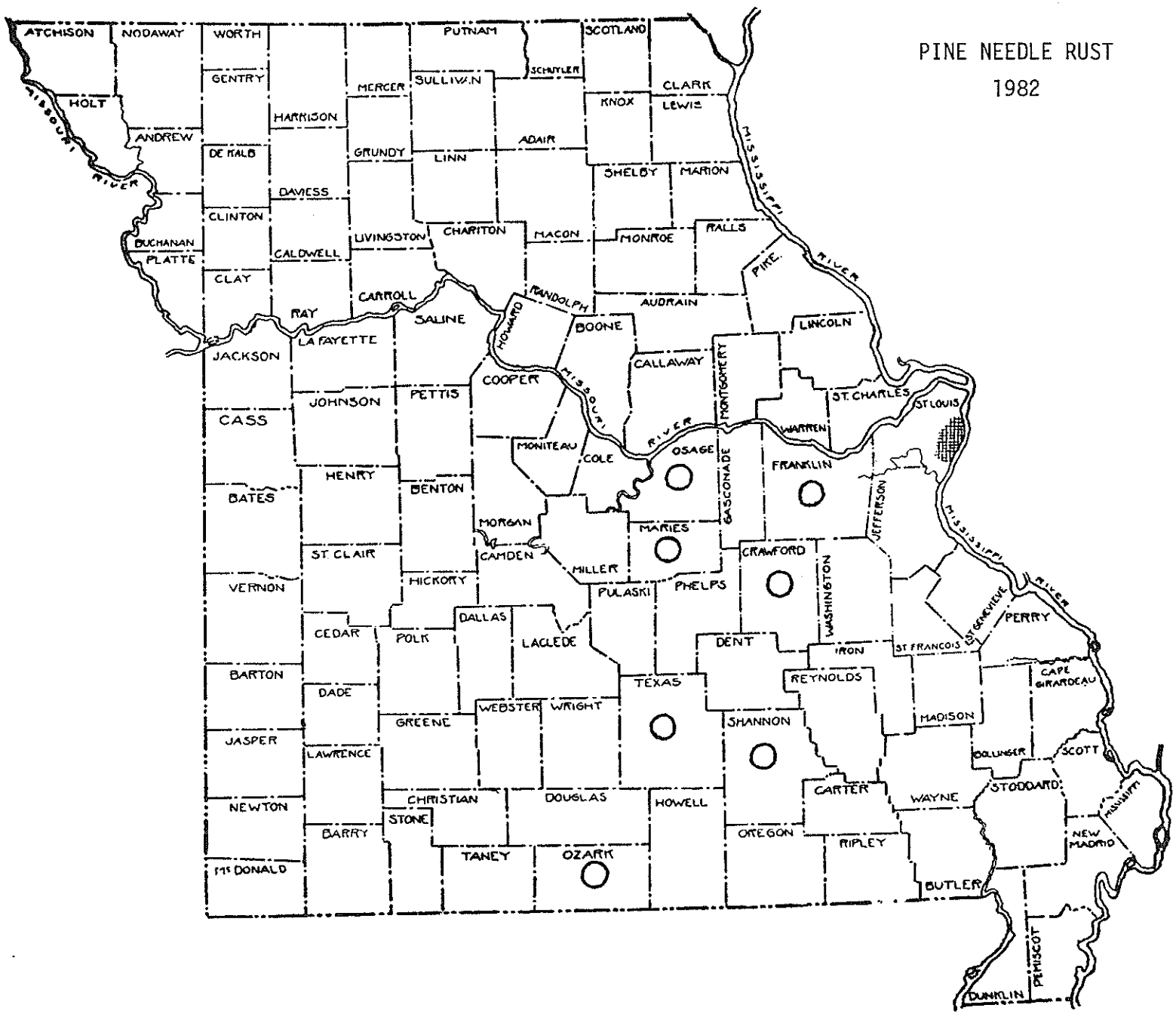
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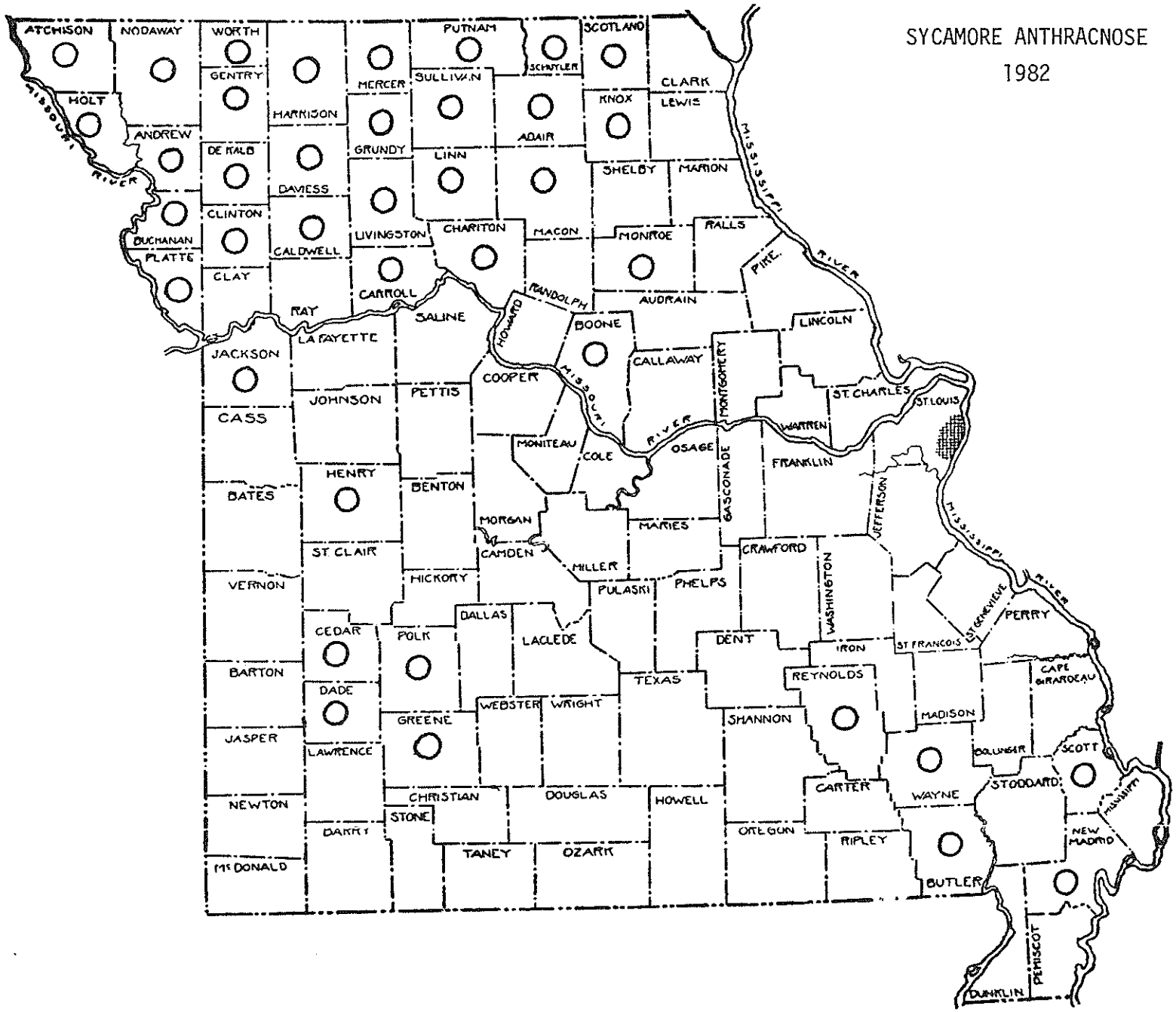
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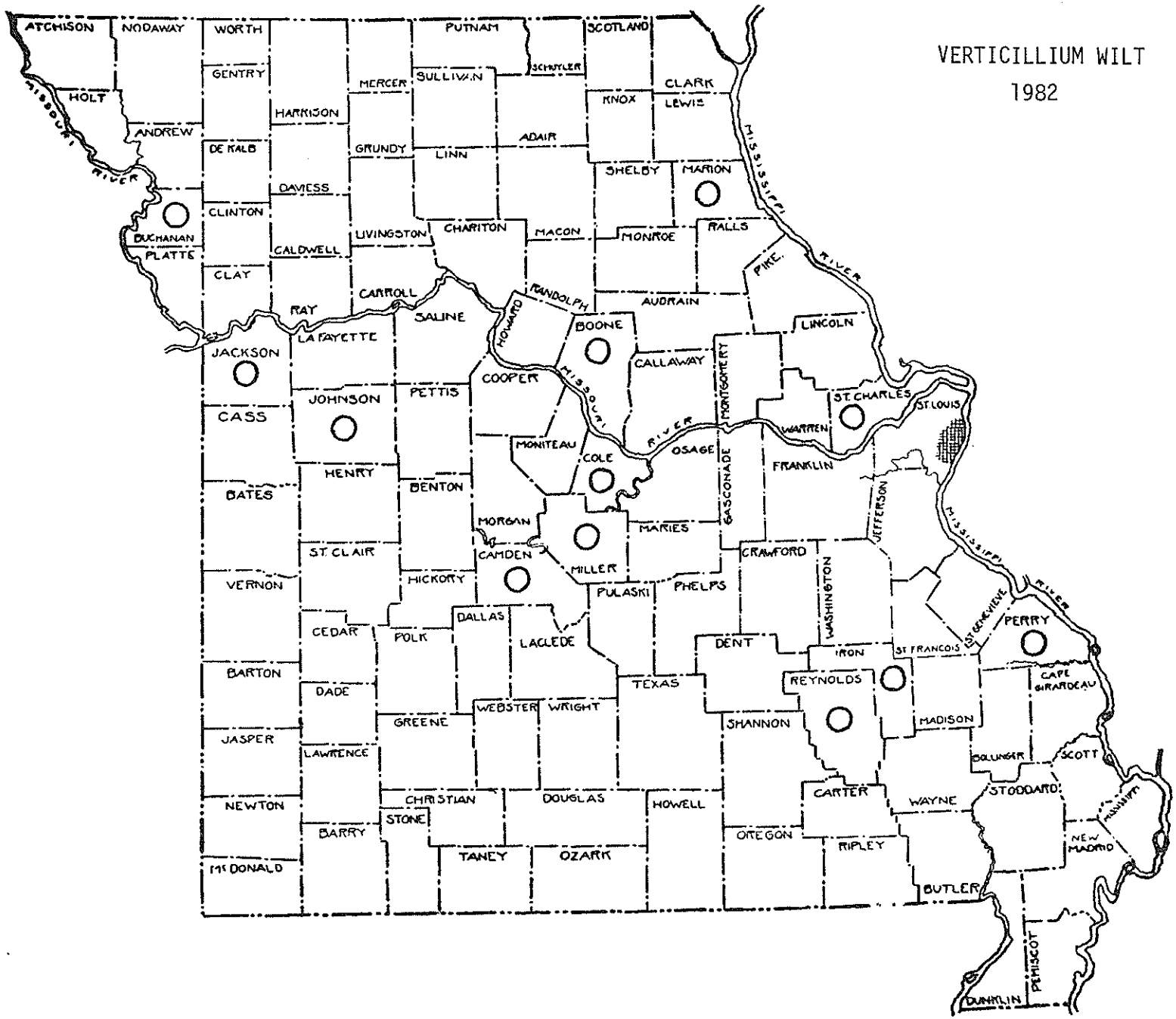
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